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VIEWS, NEWS AND INTERVIEWS.

The scarcity of the coin of the realm, as well as the coign of vantage, during the depression of the Summer months is well illustrated by this true story. A strong and conservatively managed telephone company, realizing that some heavy bills had to be met in a few days, decided, after some six hours' debate on the part of the cautious directors, to authorize their treasurer to go to their bank where they had carried a deposit averaging from $50,000 to $80,000 for several years, and borrow $25,000 for 60 days. The treasurer set gaily forth to arrange the financial matter during his half-hour for lunch. One o'clock came, no treasurer; two o'clock, still he was absent, and so it was at three o'clock. At four o'clock, a spineless, perturbed and overwrought individual staggered into the office of the general manager and falling into a chair gasped out:

"I was to borrow $25,000 for 60 days in 15 minutes wasn't I?" "Yes." "Well, I have been four hours working harder than I ever did in my life, and have finally succeeded in borrowing *five thousand dollars for five days!*"

It is reported that the Egyptian government has decided to authorize the construction of a system of tramways in Cairo, and that electricity will be the motive power.

An ex-street car mule in Los Angeles, Cal., from force of habit, had wandered between the rails. The electric car came along and the mule imagined he was at the old business. The motorman put on a little extra speed, but the mule maintained the regulation distance between himself and the car. Faster and faster went the car; so did the mule. he had no thought of shirking, to the huge delight of the spectators and the motorman.

One cause of the embarrassment of the Denver cable railway is to be found in the general depression throughout Colorado. Thousands of Denverites who used to ride to business either have no business now or reach it by walking. The orders of the Denver street railways to their printers for tickets have fallen off by hundreds of thousands since the pinch began to be felt in Colorado, and in this as in a hundred other matters the sudden economies of an ordinary lavish community have been manifested.

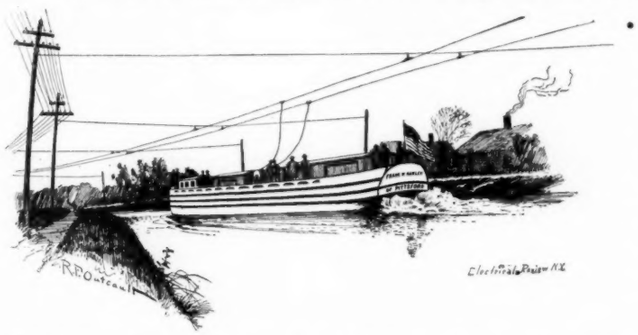
The inadvisability of laying electric light wires and gas pipes together is often urged. An electrician, while staying at a summer hotel, observed that the incandescent lamps with which the building was illuminated blinked at every discharge of lightning during a storm, although the interval which elapsed between the blinking and the peals of thunder indicated the remoteness of the storm. This was doubtless due to induction produced by the surgings of the lightning discharges, for in heavy and near discharges the lights were completely extinguished, although no fuses were burned. These observations lead the observer to maintain that the system of carrying electric light wires along gas fixtures where electric light fixtures and gas fixtures are combined, is fraught with great danger. If there is any leakage of gas at the joints of the gas pipes or through a sand hole in the casting of the pipes, electric sparks, arising through resonance effects or from the ordinary passage to earth of an electric charge brought into the building by the electric wires, can ignite the escaping gas and produce a mysterious conflagration. Such a conflagration was averted in the hotel in question only by the careful scrutiny of an attendant.

The new police boat, "Patrol," for the city of New York, which was launched the other day at Sparrow's Point, Md., has a 4,000 candle-power search light. She is 143½ feet long, 23 feet beam and 10½ feet deep. She will cost about $52,500 and resembles a yacht.

The Calumet Electric Street Railway, operating about 54 miles of track in the southern part of Chicago and a number of its suburbs, has placed in each of its cars a map about 14x17 inches in size, which shows plainly how to get to various points on the line. The map is a blue print, the routes are shown in heavy white lines, and only the streets through which the tracks run are given. The names of these streets and of the suburbs are printed in large white letters, easily read from any seat in the car. The maps have proved of much value to the visitors in Chicago during the Columbian Exposition, as well as to the residents of the section where the lines run.

An ingenious contrivance for stopping an engine in a machine shop occupies not more than a cubic foot of space, and consists of an electro-magnet, a system of small levers and a cylindrical chamber at right angles to the steam supply pipe, this chamber containing two connected valves, one thick and the other thin. When the steam is shut off the thicker valve lies across the main supply pipe, but, when the steam is on, the two valves lie in the cylinder on either side of the upper pipe; when in this position the valves fit loosely enough into the cylinder to allow a strong pressure of steam on all sides of them. The motive power of the mechanism is furnished by two small electro-magnet spools, through which a current is sent by pressing the button in any part of the shop, this attracting to the magnets a small bar of steel, which is fastened at one end of an angular lever; at the end of the lever's other arm, which runs horizontally, and on its under side, is a small notch, into which, when the machine is ready for action, fits the end of a vertical lever, to which is fastened a valve lever, hanging by the perpendicular, and so arranged that when it falls the two levers separate. The action of the magnet raises the end of the horizontal arm of the angular lever and loosens the smaller vertical lever, so that the weight of the valve swings it down in a semicircle, thus hitting a cam and tripping a valve. This exhausts the steam outside of the smaller valve in the cylinder, and the steam beyond the other drives it across the supply pipe with great force, shutting off the steam from the engine within 15 or 20 seconds.

A street cleaning contractor says that the value of electric street railways as helps in keeping streets clean and watered is not yet appreciated. If his ideas were carried out early every morning, in a city like Boston, large cars, built after the fashion of the gravel cars run on steam roads, would be sent over all the lines of track, and garbage and refuse, gathered along the way, shoveled into them. Following these cars would come large watering cars able to wet down the streets from curb to curb. The advantages of this system over the present one of carting off refuse and dragging watering carts by horses are that it is cleaner and faster. There would have to be no waiting for carts to go off and unload, and an item of saving would be in the reduction of the number of men needed, as, under the electric system, it is estimated that the work of street cleaning could be easily done by two-thirds of the number now employed.



THE ELECTRICALLY PROPELLED CANAL BOAT "FRANK W. HAWLEY"—A CORRECT SKETCH FROM PHOTOGRAPHS BY THE EASTMAN KODAK COMPANY.—(SEE PAGE 174.)

THE MOTORMAN.

A REPRESENTATIVE OF THE "ELECTRICAL REVIEW" SPENDS HALF A DAY ON THE FRONT PLATFORM.

HOW TO SECURE AN INTERVIEW WHEN THE PHYSICAL PERSON CANNOT BE ADDRESSED —A BIG BROOKLYN LINE AND ITS KIND TREATMENT OF ITS MEN — A CRITICAL MOMENT — BREAK-DOWNS QUICKLY REPAIRED—THE JUMPING TROLLEY WHEEL —ELECTRIC ROADS AND ELEVATED ROADS.

With the advent of the trolley car the driver of old was transformed to the motorneer of the present; with the birth of the cable car the driver was changed to the gripman. It is simply a case of things which are equal to one thing being equal to each other, and the gripman of the cable car has practically the same duties as has he who controls the motor of the electric cars. Their experiences must be very similar. Let us see first, however, what the motorneer does, how he lives and what changes affect him.

The Brooklyn trolley roads have grown gradually into the system of a corporation, which may be classed among the foremost in point of capital invested and interests concerned. Their lines are numerous and the men they employ may be counted in the thousands.

Owing to several accidents that have occurred recently, the authorities have deemed it expedient to issue a rule forbidding all motorneers to talk to passengers. Their mind must be centered on their work and no foreign thoughts are allowed.

Bearing this in mind, I turned my steps towards the office of the Brooklyn City Railroad, to obtain permission, if possible, to talk with the motorneers. Much to my chagrin, however, I found that if I was to comply with the laws I could not converse with them. How then would it be possible to secure a few facts and figures from the employés of the road? No exception would be made in my favor, and I was obliged to set my wits at work to devise a scheme whereby I could learn something of their habits and customs.

"Of course," said one of the officials, "we can't prevent you from riding on the cars,

but you can't rely on any statements the motorneers give you." I said nothing, perhaps I thought differently, so the following is the plan I made out:

Having attended a spiritualistic seance some few years ago, I remembered I could talk to a departed spirit through the agency of a medium. Now, thought I, the spirit of a motorneer is not departed, therefore, there will be no need of a medium. So getting on a Third Avenue car I began to question the motorneer. It was at once apparent that he was very reticent about answering (while he was in the crowded thoroughfares), but as soon as we got well out towards the less densely populated district, the cold wind which blew fiercely down along the avenue from the water front, seemed as if it set his mouth in motion, and I could understand a few articulate sounds which came from the dim recesses of a heavy mustache and a still heavier ulster. He was a good-natured man, was this motorneer, and he seemed perfectly willing, I might add eager, to talk to me, but all of a sudden I remembered that I could not break the rules by talking to him, so I addressed his spirit, and the following conversation took place, which I believe would be just as authentic had his corporeal self conversed with me.

I was desirous of obtaining the practical side of the motorneer's life. I wished to know what hardships he had to go through, what pleasures he had, if any, and above all, how he liked his work, and thus I addressed him:

"What are your hours?"

In muffled tones the answer came, "From one in the afternoon to eleven at night."

"These are very agreeable hours," I suggested.

"Yes, but I work for them," said he, "Thirty-two years ago I drove horses for this line, and while I am not driving horses for them to-day, I am doing harder work, for two dollars a day."

"Rather a small amount to live on," I suggested.

"Well," he answered, plaintively, "I am better off than a good many others. I only have a wife and seven children at home, but there are other men on the road who get a dollar and a half a day, and many of them have even more mouths to feed. But I tell you we are treated nicely on this road; I'd rather work for them than for any other big company," and he looked as if he meant every word he said. "Why, if I am sick they don't dock me—but then perhaps I am a special case."

All of a sudden a little child ran across the track; as quick as lightning his foot struck the gong, his left hand shut off the current and with all his might he applied the brake just in time. The car brushed passed the child and I thought I saw the motorneer breathe a sigh of relief. Turning around to me, he said, "That is one of the trials of this life. Blest if I don't believe that women and children were made to bother the life out of us people."

I thought that rather a broad statement and asked "Why?"

"Well," came the answer, "that little incident is only one of the several hundred we have every day."

When we realize what the motorneer has to do, we should make due allowance for whatever little annoyances we are put to, for his work is performed with the combination of eyes, ears, hands and feet, and for all this he receives a pay equal to that of an ordinary workman.

"In learning the business," I asked, "don't you often get confused and make mistakes?"

"Well," he said, "the company is very lenient with us; they are not down on the workingman. Of course, temptations are very great to run into the tail board of a wagon now and then, but then when we think of the seven little mouths at home, we have to keep down our anger and politely request the individual in front to get off the track. Oh, I tell you the life of a motorneer is not made of roses."

"How about accidents?" I inquired.

"Don't speak of that," he said; "the sight of one is a thing to be remembered for a lifetime. I saw one recently, and well—"

I perceived it was better not to ask any questions on that head, so I desisted.

"What do you do," I inquired, "when accidents happen on the line?"

"Oh, they are repaired very quickly; it is only a matter of 10 or 15 minutes before the line is in operation."

"This speaks well for the system," I remarked.

"As soon as the signal comes into the central station, or the nearest place where the repair wagon is kept, a gang of men immediately start out with the necessary implements, with a wagon which has upon it a platform capable of being moved up and down. Upon this the men get, and, with remarkable rapidity, make the necessary repairs."

Several times, as I was talking with him, the trolley wheel jumped the wire and the passengers inside were amused by the efforts of the new conductor to readjust the trolley pole.

"Does that happen often?" I inquired.

"Very seldom; only in places where the line has been a little worn or bent, and a twist is given, thereby derailing the trolley wheel."

At this point we passed underneath the elevated road which runs along Third avenue for quite a distance.

"This is something new?" I remarked.

"Yes, and you have no idea how it has hurt the trolley line. Our receipts have dwindled to at least half of what they were before the elevated road was built, and I don't doubt that if it were to run way out to the terminal, our receipts would come way down, to make the line almost unprofitable."

Thus we see a case of the tables being turned. On Fulton street the trolley roads greatly diminished the receipts of the elevated road.

"Tell me some particulars in the life of a motorneer," I suggested.

Looking forward at a woman who was frantically waving her hand for the car to stop in the middle of the block, with what I thought somewhat of a smile as the car gracefully sailed past her, he said, "We all have our troubles, but the life is exciting."

"Exciting in its regularity," I suggested.

"Yes, with most of the motorneers it is a case of get up, work, and go to bed, no pleasure, no diversions, nothing to make life anyway pleasant. That is what I say when I am not feeling pretty well, but somehow, when the wind blows straight in my face, and I can't tell whether my nose is on my face or not, on account of the cold, I think what might happen if I were to get sick. I've never been sick yet, but I believe the company will take care of me.

"What do you get from the company," I asked, "other than your regular wages?"

"Absolutely nothing. No present; they don't even insure our lives. A few of the motorneers are better off and manage to lay aside a little and provide for their family in case of their death, and a number of them secure policies, enabling them to receive the amounts paid in inside of 15 years. This is the only way they could afford to insure their lives. Very few of them have accident insurance policies."

"How do the labor unions affect you?" I inquired.

"Well, it is my opinion," he answered, "that the man that attends to his own business and is satisfied with the pay he gets, needn't bother himself about the unions. I know if I employed a man who was not satisfied with the wages I paid him, I should feel very much like telling him, if he did not want to do the work for what I paid him, he needn't do it at all."

It seemed to me that he stated one side of the labor question in a very simple manner, and showed rather conclusively how he felt as regards its workings.

"Up to the present time my nerves have been affected considerably by the great caution we have to take, and it would be a blessing for us if the company would adopt a fender which would relieve the strain from our minds."

Here, also, we have an expression of a sentiment which shows conclusively the position that the motorneers take as regards life-saving devices. This, of course, would shift the responsibility considerably and take a great deal of needless worry from their minds.

As we neared the bridge a string of trolley cars extending for two or three blocks told of some trouble on the line. Immediately the driver descended from his platform, and looking back at me said: "The first minute free to-day." Hastily entering a tobacco shop he purchased a piece of plug cut, and returning with it remarked: "This is the only pleasure I have during the day."

JULIAN A. MOSES.

Lines of Magnetic Force Around a Straight Conductor.

TO THE EDITOR OF ELECTRICAL REVIEW:

In this paper, of November 18, Mr. S. T. Moreland answered a communication of mine published in your columns on October 28. I submit the following in reply:

Bearing in mind that "the work required to move a pole P (unit magnetic pole) from one point to another is the product of P by the difference of the *magnetic potentials* of these two points;" and that a unit magnetic pole is a pole so small as to have no distortive influence on the field in which it is supposed to be placed; it is, indeed, questionable

QUEEN'S NON-INDUCTIVE WATTMETER FOR DIRECT CURRENTS.

whether Mr. Moreland's reasoning is well founded.

Under the title of "Electromagnetics" in the book on C. G. S. Units, by J. D. Everett, the following quotation is found: "A *current* C (or a current of *strength* C) flowing along a circular arc, produces at the center of the circle an intensity of magnetic field equal to C multiplied by length of arc divided by square of radius." Consider the wire to be straightened out, eliminating the focusing effect the wire has when bent in a circle; that is, each element of length radiates magnetic force (*not* Faraday lines of force) in parallel lines instead of converging ones. It is to be understood in regard to the bringing of rays of force, so to speak, into parallelism, by straightening out the wire, that this applys only to the planes parallel to the conductor. Thus the factor of length is *practically* eliminated, and it is now evident that the field intensity will diminish inversely as the square of the distance from the wire.

In the book "Principles of Dynamo Electric Machines," by Carl Hering, the density of lines of force is represented graphically. No verbal mention is made about the *rate* of decrease of density of lines that encircle a straight conductor, but the reader is referred to the figure or sketch for the illustration of this density, which shows clearly that the magnetic intensity decreases inversely as the square of the distance from the wire.

I notice several typographical errors in Mr. Moreland's mathematical expressions. In the above (second paragraph), I do not take exception to these mistakes but intimate that the premise of his reasoning is not applicable to the case in consideration.

November 24. F. H. L.

Queen's Non-Inductive Wattmeter for Direct Currents.

A dynamometer wattmeter constructed so as to work satisfactorily on alternate current circuits will work with equal satisfaction on continuous current circuits. The reverse, however, is not true. Masses of metal in proximity to the moving parts introduce no errors in continuous current measurements, but in alternate current measurements their presence becomes fatal. Aside from a metal case, small pieces of metal near the system and even the binding posts on the outside are likely to introduce serious errors. Not only this, but the inductance and capacity of the fine wire or potential circuit must also receive consideration.

An electro-dynamometer of the Siemens type, when employed on continuous currents, gives readings proportioned to the square of the current, I^2; when employed on alternating currents it gives readings proportional to half the square of the maximum value of the current, $\frac{I^2}{2}$. Employing the same instrument as a wattmeter to measure the energy consumed by a circuit carrying a continuous current, the one coil known as the current coil being placed in series with the circuit to be tested, and the other, known as the pressure coil, in shunt to the same circuit, a sufficient amount of extra resistance being added to it in series if necessary, the readings become proportional to the product of the currents in the two circuits, that is to $K\,r\,i'i = i\,E = W$, the energy consumed, r being the resistance of the fine wire circuits, i' the current in the same, K the constant for the instrument, and i the current in the series coil.

The instrument shown in the figure is constructed on the inclosed dynamometer principle, the case being of brass, mounted on a wooden base built up of a number of sections to prevent warping. The extra resistance, about 3,000 ohms for a 110 volt circuit, is wound non-inductively and in sections on wooden spools placed inside the base, which is suitably ventilated. Within the case half of which may be easily removed, are to be found both the fixed and movable coils, the latter coil consisting of from 100 to 200 turns, depending on the range desired, of No. 34 copper wire wound on a light mica form. This coil is suspended from a rigid support by means of a fine phosphor bronze strip one and one-half inches long, a spring being provided at the bottom for the return current.

Suitable guides and a clamping device are provided, the former to prevent the coil from being used when slightly out of center, due to improper leveling. A spiral spring attached to the torsion head serves as the control. The upper end of the pointer, attached to the system, plays over the zero of the scale the same as in the dynamometer. The use of mercury being entirely avoided renders the instrument perfectly portable, and the employment of a large amount of extra resistance, along with the delicately constructed and suspended system, reduces to a minimum the power consumed by the wattmeter itself, and at the same time leaves t quick to respond to any change in the power being measured. In order that the nstrument may be applicable throughout a wide range of current, two pairs of fixed or current coils are provided, the one pair consisting of 10 turns each with a carrying capacity of 25 amperes, and the other of one turn each with a carrying capacity of 250 amperes, placed on over the other coils. Thus, either 25 or 200 amperes may be made to effect a complete revolution of the torsion head. The potential circuit may be made applicable to the higher voltages by the mere insertion of more extra resistance. Queen & Company, Incorporated, Philadelphia, are the makers.

Telephonic Communication in Japan.

The telephone is becoming more and more a necessity in Japan. At Tokio, the exchange has received more demands for connections than it can at present accommodate, while in the town of Nara, famous for its old castle, it is proposed to establish a telephone exchange, the necessary application having recently been made.

The Worthington Condenser.

A VALUABLE ADJUNCT TO ELECTRIC LIGHTING PLANTS.

Henry R. Worthington, 86 Liberty street, New York, the well-known manufacturer of hydraulic machinery, has issued a special catalogue entitled, "The Worthington Condenser in Its Application to Stationary and Marine Engines, Vacuum Pans and Steam Pumping Machinery." Considerable expense has been incurred in the preparation of this pamphlet, both as to the illustrations and the letter press. It is extremely interesting to anyone who desires information about condensers, and is sent free on request. By permission we reproduce from this catalogue the accompanying illustrations and the following description of the Worthington condenser as an adjunct to electric lighting plants:

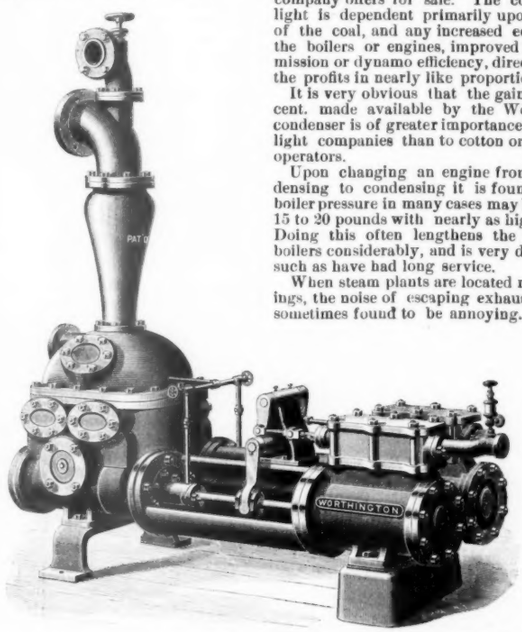


FIG. 1.—WORTHINGTON CONDENSER USED WITH 250 HORSE-POWER ENGINES.

Many of the plants that were erected during the early period in the history of electric lighting were located without the advice of qualified steam engineers or the benefit of advanced practice. The boilers and engines were not by any means economical, but answered well for a time. The question of the economical production of power was lost sight of in the strife to be the first in the field with the electric light. Furthermore, it was expected by some that electricity would be so cheap that the cost of production needed not to be taken into consideration. This, however, has now assumed quite a different aspect, and the power plant is conceded to be the main feature in the success or failure of an electric lighting or power venture.

A large number of steam engines in electric lighting plants are situated so that an adequate supply of water can easily be had for condensation, but are at the present time non-condensing. They are laboring under a back pressure of 14.7 pounds that is caused by exhausting against the atmosphere, and if they are in good fair condition they should by all means be run condensing.

The value of a vacuum to an engine under normal conditions is, at a low estimate, equal to 25 per cent. of the power developed by the engine running non condensing. This means that, by the use of a Worthington condenser, the coal consumption can be reduced one-quarter to one-fifth with the same production of light, or the number of lights may be increased a fifth without burning more fuel.

It is hardly necessary to more than intimate that this result is acceptable to any electric lighting company, and that this matter of Worthington condensers, as an adjunct to dynamo engines, should have the most careful consideration.

In cotton mills the steam plants are carefully arranged, and have the attention that is necessary to insure the highest economy, and condensing engines are quite generally used; but the money paid for coal is of small importance when compared with the value of cotton manipulated by the company. Flour mills are also large users of power, and every effort is made to have the fuel bill as small as possible, but still the much greater cost of the wheat places the cost of the coal in a secondary position.

With electric light and power companies, however, the thing is very different; the cost of fuel is the great expense of maintenance. By the combustion of coal, a latent energy is aroused, which, through the agency of steam and the steam engine, becomes motive power. The function of the dynamo is to change this power into its equivalent electricity, and electricity in turn produces light. This light is the material that the company offers for sale. The cost of the light is dependent primarily upon the cost of the coal, and any increased economy of the boilers or engines, improved belt transmission or dynamo efficiency, directly affects the profits in nearly like proportions.

It is very obvious that the gain of 25 per cent. made available by the Worthington condenser is of greater importance to electric light companies than to cotton or flour mill operators.

Upon changing an engine from non-condensing to condensing it is found that the boiler pressure in many cases may be lowered 15 to 20 pounds with nearly as high results. Doing this often lengthens the life of the boilers considerably, and is very desirable to such as have had long service.

When steam plants are located near dwellings, the noise of escaping exhaust steam is sometimes found to be annoying. This objectionable feature may be entirely relieved by the application of a condenser.

Several engines may be exhausted into one condenser, and a vacuum maintained on all or part of them at a time.

The exhaust pipes from the engines lead to an exhaust trunk to which the condenser is attached. When an engine is stopped, it is shut off from the exhaust trunk by a gate valve in its exhaust pipe. In large plants it is well to divide the engines into groups, and use two or more condensers, putting those engines which have about the same time of running in the same group.

At stations where the water supply is distant, inexpensive means can often be devised whereby the water can be reached. An excellent method is to lay a conduit, connecting the water supply with a well in the vicinity of the engines. From this well the water is readily taken by the condenser if the lift is under 20 feet. Where the lift is greater, it is practical to lower the condenser by placing it in a pit. A cheap and serviceable conduit can be constructed of sewer pipe laid level, and at such a depth that a flow of water into the well is assured.

The quantity of water needed to properly condense the exhaust steam depends, of course, on its temperature. It may be stated that one and one-fourth to two gallons of water per minute are required for every horse-power developed by the engine. The use of city water supply for condensation is not recommended, unless the cost is so low as to be merely nominal.

For plants wholly distant from a natural water supply, the Worthington self-cooling condenser will commend itself as a highly desirable and valuable apparatus.

The drawing, Fig. 2, is taken from an electric light steam plant, consisting of two high-speed engines of well-known build, upon which a vacuum is maintained by a Worthington condenser. The condenser is located below the level of the engine room floor, to bring the lift of the injection water within the prescribed limit of 20 feet.

The exhaust trunk is laid below the flooring, and the whole arrangement presents a compact and neat appearance. It will be noticed that the injection valve and the small globe valve supplying live steam to the condenser pump are quite conveniently placed, being near together and easily reached by the engineer from the engine room floor. The cylinder cocks of each engine are piped separately into the exhaust trunk, and the steam chest drain pipes have also independent entrance into the exhaust trunk. The condenser is shown exhausting into the trunk, and, consequently, a vacuum is maintained on its cylinders also.

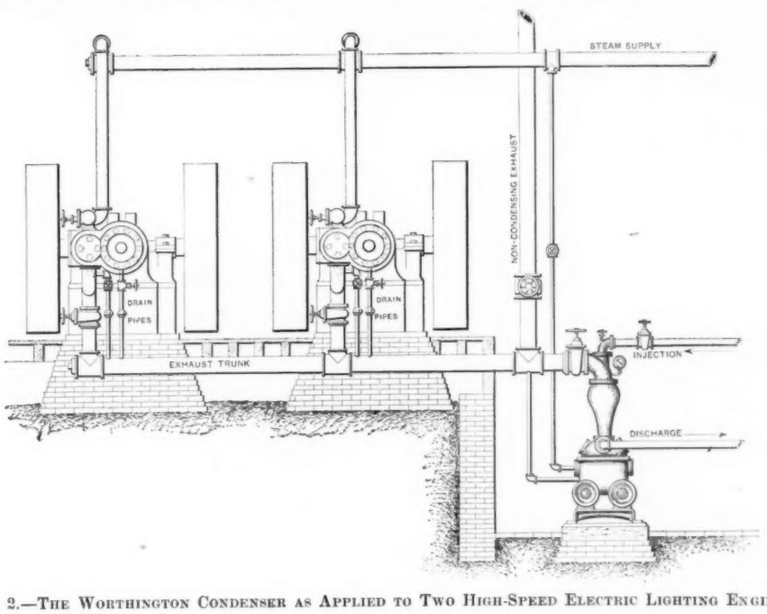


FIG. 2.—THE WORTHINGTON CONDENSER AS APPLIED TO TWO HIGH-SPEED ELECTRIC LIGHTING ENGINES.

TELEPHONE CHAT.

Coleman, Mich., people are planning a telephone line to Mt. Pleasant, 15 miles away.

The Wisconsin Telephone Company is rebuilding its line between Waupun and Fond du Lac, Wis.

One hundred and fifty telephone girls in Chicago have organized what will be known as the Chicago Telephone Operators' Beneficiary Society. The organization proposes to pay $25 on the death of a member, $3 a week sick benefit and $2 a week to those out of employment.

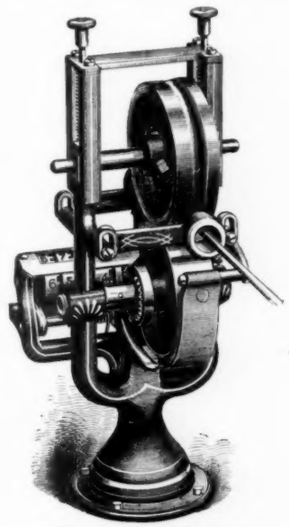
The Missouri and Kansas Telephone Company, of Kansas City, Mo., has made glad its stockholders by sending out its dividend this month for the quarter ending September 30, 1893. The officers of this company are J. R. Mulvane, president; Wiley W. Smith, secretary; and N. R. Ferguson, treasurer. The Missouri and Kansas is one of the ably managed companies.

A representative of the Southwestern Telegraph and Telephone Company is in Victoria, Tex., making arrangements to place in operation the new automatic switch board system, and do away with the old central office system now in use. The service is furnished much cheaper by the new method, which is claimed to be more satisfactory in its workings. A sufficient number of new subscribers has already been obtained to justify the change, with the prospect of a much greater increase in the number.

A New Wire Measurer.

Anyone who has had occasion to measure out lengths of wire will thoroughly appreciate the value of the device which we present in the accompanying illustration. This wire measurer is manufactured by the Sterling Supply Company, 47 Cedar street, New York, and is being introduced by the Central Electric Company, of Chicago.

Whether the lengths of wire be long or short, this little device automatically measures the exact number of feet reeled off. It is a very compact apparatus, neatly constructed and requires no adjustment whatsoever. It may be placed in any position and operated by anybody who has common sense enough to put the wire in the hole made to receive it.



A USEFUL WIRE MEASURER.

In case lengths are to be measured off on pieces of wire, and if it is not desired to cut the same, little pieces of ribbon or cord may be attached to the wire as it passes out through the machine, the operator reading the amounts as they appear on the recording device. There is little in it to get out of order, and with ordinary usage it need never wear out or operate inaccurately in a reasonable time.

Telephone Work in Colorado.

The Greeley circuit in Colorado was opened by the Colorado Telephone Company on November 16, adding Berthoud, Loveland, Fort Collins and Greeley to the system. The following places are now connected by telephone in Colorado: Denver, Alma, Black Hawk, Berthoud, Boulder, Canon City, Cassels, Central City, Clifton House, Coal Creek, Colorado Springs, Como, Bear Creek, Erie, Fairplay, Fort Collins, Georgetown, Greeley, Golden, Idaho Springs, Jefferson, Lafayette, Leadville, Littleton, Longmont, Louisville, Manitou, Monument, Morrison, Nevadaville, Pueblo, Rockvale, Silver Plume, South Pueblo and Williamsburg.

A Second Test of Electric Power on the Erie Canal.

HOW CURRENT WILL BE DISTRIBUTED FROM NIAGARA FALLS.

While the first test of electric power as applied to canal boats at Pittsford, N. Y., on Saturday, November 18, was entirely successful, a more satisfactory trial was had on Monday, November 20. When Mr. Frank W. Hawley, of Pittsford, who has had charge of the demonstration from the start, arrived at the scene on Saturday morning he found his guests assembled and everything in readiness for the trial except that he had no means of getting the current from the trolley wire to the motor. The overhead traveler had not arrived from the Pittsburgh shops of the Westinghouse Company, which built all the experimental apparatus. With commendable ingenuity Mr. Hawley proceeded to get two stiff trolley poles from cars of the Rochester Street Railway Company. These were hastily nailed to one of the deck-houses on the boat and a start was made.

The boat "Frank W. Hawley" was loaded with sand to show the application of electric power to the actual work of running a boat with a cargo. Through some mistake the laborers shovelled aboard 175 tons of sand instead of 125 tons, which is a normal load for the "Hawley." Then about 300 people got aboard. Consequently, as the water in the canal is very shallow, the "Hawley's" propeller ran in the mud during the whole of Saturday's test.

On Monday the overhead traveler arrived from Pittsburgh and another test was had. The normal load was put aboard, and with a few invited guests, Mr. Hawley manipulated the boat with ease, turning and twisting about the curves and wider portions of the canal in a perfectly satisfactory manner. Two reels, each having 150 feet of flexible cable, are attached to the double traveler, so that the boat has plenty of leeway.

In an interview with Mr. Hawley, an ELECTRICAL REVIEW representative learned the relations and connections of the various companies interested in the transmission of current from Niagara Falls. As this matter has not been very plain to many people, here is an explanation of it: The Cataract Construction Company built the plant at the Falls and will do all the construction work on the lines and transformer stations throughout New York State. The Niagara Falls Power Company simply operates the hydraulic plant at the Falls, which supplies power to the electric generators. The Niagara Falls Light and Power Company is a local electric light company in the town of Niagara Falls. It has nothing to do with the transmission of power, and should not be confounded with the Niagara Falls Power Company. The Cataract General Electric Companies, with general offices in New York City, is the name of the parent company, which will be the commercial agent for the sale of electric power throughout New York State, except in Niagara and Erie counties.

The officers of this parent company are Wm. Mertens, president; Frank W. Hawley, vice-president; and Charlton T. Lewis, secretary and treasurer. Sub-companies will be formed in various localities in the State, and the territory controlled by the parent company will be sub-divided among them. There are already four sub-companies formed. They are as follows: Cataract Electric Company, of Rochester, Cataract Electric Company, of Syracuse, Cataract Electric Company, of Utica, and Cataract Electric Company, of Albany. None of these companies will do any construction work; they will be merchants with electric power for sale.

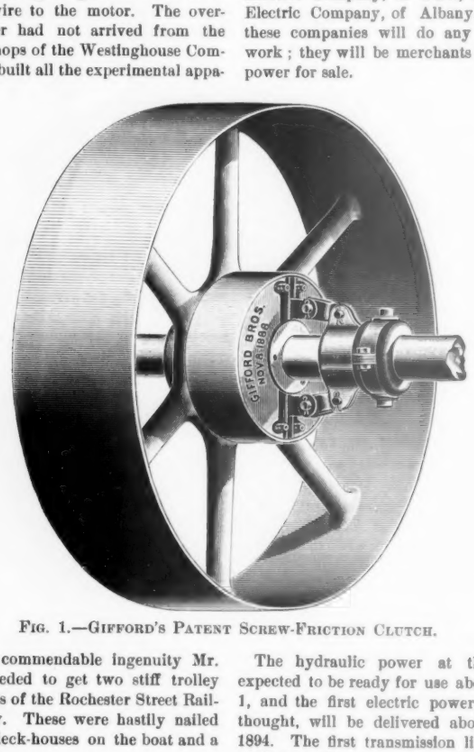


FIG. 1.—GIFFORD'S PATENT SCREW-FRICTION CLUTCH.

The hydraulic power at the Falls is expected to be ready for use about January 1, and the first electric power, it is now thought, will be delivered about April 1, 1894. The first transmission line will run to Buffalo, Tonawanda, North Tonawanda, Wheatfield and Lockport, N. Y.

Mr. Hawley was asked whether the oft-repeated report that the banks of the Erie Canal would be used for the main transmission lines was true.

"We have not yet decided," replied Mr. Hawley, "where our lines will run or whether they will be overhead or underground. We have had a number of samples of very good underground cable submitted to us and these are now being tested. We shall run our lines wherever the most business is, and we have secured rights which will enable us, under the proper conditions, to run the lines where the power is wanted.

"My object in making this test of electric power, as applied to canal boats, was merely for the purpose of creating a market for our electric power. You can readily see that this is but one of many possible applications of electric power, and that the canal boat business is but an incident, although an important one.

"On the Erie Canal," continued Mr. Hawley, "there are about 3,400 canal boats in use. Of these, somewhere in the neighborhood of 500 use steam, and the remainder are drawn by horses. We claim that electric power will show a saving in the cost of operation of 33 per cent. over either horse or steam power. Our claim is based on the saving of valuable cargo space in the boat and in the number of men required to run the boat. We make available for freight carrying, the space now used for horse-stalls, forage and sleeping apartments on the boats drawn by horses, and in the boats run by steam power we can save the room now taken up by the engine, boiler and coal. The motor requires practically no valuable space. We can run at six miles per hour without creating a wash which would be destructive to the canal banks."

The boat "Frank W. Hawley" has been dismantled of her electrical apparatus and taken to Buffalo where she will be rebuilt. The illustration on the first page of this issue is sketched from photographs by the Eastman Kodak Company, of Rochester, N. Y.

Gifford's Patent Screw-Friction Clutch.

Gifford Brothers, founders and machinists, Hudson, N. Y., are the manufacturers of the screw-friction clutch illustrated herewith. In adjusting this clutch the following directions are to be observed:

Throw the shipping-hub as far back as possible. Loosen the clamp-bolt nuts (4) with wrench accompanying the clutch. Insert the other end of wrench through the slots of disk and between the lugs of the brass nut, inside. Measure the distance from the end of wrench to shaft or hub. Turn the brass nut toward the shaft, moving one inch at end of wrench. Treat each of the four nuts as above and alike. Screw up the clamp-bolt nuts again till flush with the end of bolt. Try the shipping-hub. With a lever three feet long from fulcrum-bolt it should require the full power of one hand to force the hub to its working position. If it moves too easily repeat the directions given above; but if too hard turn the brass nuts from the shaft half as much as thrown in. Be sure to turn each nut exactly the same distance.

Gifford Brothers are equipping with this friction-clutch the model plant of the Suburban Electric Company, at Elizabeth, N. J.

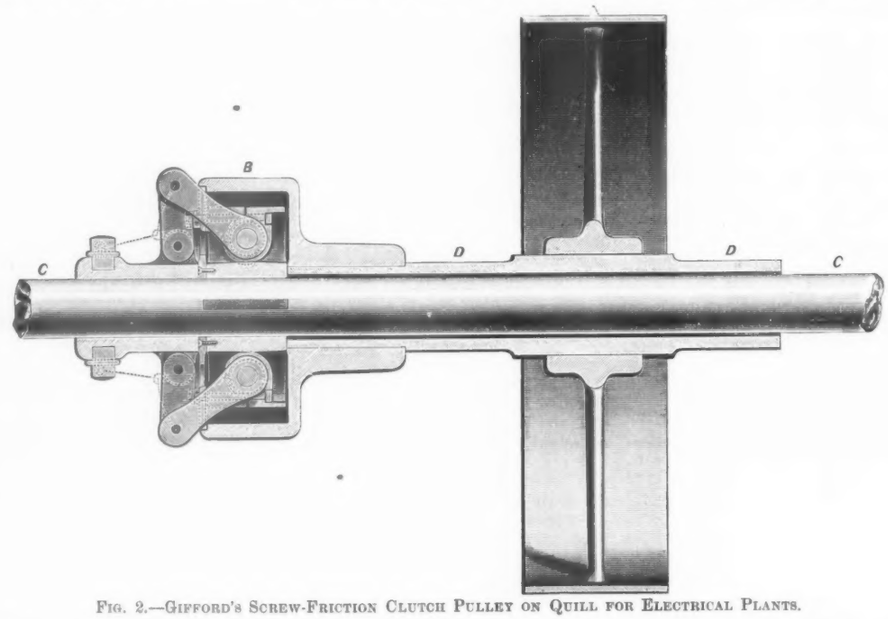


FIG. 2.—GIFFORD'S SCREW-FRICTION CLUTCH PULLEY ON QUILL FOR ELECTRICAL PLANTS.

ELECTRIC LIGHT FLASHES.

Dover, Del., wants an electric light plant and an electric railway.

The Scio, Ore., council has appointed a committee to contract for an electric light plant.

Work on the new building for the electric light plant at the Norristown, Pa., Hospital for the Insane is being pushed vigorously forward.

The new, large 20 foot boilers to be used in the new electric light plant, at Columbia, Pa., now in the course of erection, have arrived and will be placed in position in a few days.

The New York Gas Commission met in the Mayor's office on November 22, and ordered advertisements to be made for bids for city lighting for 1894. The bids will be opened on December 11.

A trust mortgage from the Maryland Electric Company, of Baltimore, to the State Trust Company, of New York, to secure the issue of $1,000,000 30 year six per cent. gold bonds was recorded last week.

The board, at Berkeley, Cal., has let the contract of furnishing electric light to the San Francisco Electric Light Company, at $9,000 a year. The company took possession, refitted the city plant and have furnished lights for the past month.

The Marietta Manufacturing Company has placed an electric light plant in its works, at Columbia, Pa. The company will manufacture carbon for arc lights and two men are now being instructed in the secrets of the manufacture of carbons.

Electrical Section of the Franklin Institute.

The course of lectures to be delivered before the electrical section of the Franklin Institute, at Philadelphia, during the coming season includes the following:

"Thoughts on Cosmical Electricity." (Illustrated.) Special lecture. Prof. Elihu Thomson (honorary member), electrician General Electric Company, Tuesday, December 19, 1893.

"The Theory and Design of the Closed Coil Constant Current Arc Dynamo." Prof. H. S. Carhart (honorary member), professor of physics and electrical engineering, University of Michigan; president jury of awards, department of electricity, World's Columbian Exposition, Tuesday, December 26, 1893.

"Telephony." Mr. J. J. Carty, electrician Metropolitan Telephone and Telegraph Company, Tuesday, February 27, 1894.

"Magnetic and Dielectric Viscosity." Prof. M. I. Pupin, professor of pure science, Columbia College, Tuesday, April 24, 1894.

Dr. Wm. J. Morton, New York city. The title of this lecture can not yet be announced. It will deal with some aspect of or subject connected with electro therapeutics, in which field Dr. Morton is a recognized authority. Tuesday, June 26, 1894.

The Evolution of the Fixture Art and Decorative Illumination.

READ BEFORE THE ASSOCIATION OF EDISON ILLUMINATING COMPANIES, AT NEW YORK, AUGUST 12, 1891.

BY LUTHER STIERINGER.

(*Concluded from page 161.*)

Whether the fixture was simply wired inside of the shaft for electricity exclusively, or between the pipe and the surrounding shell for a combination of electricity and gas, or outside the pipe and insulated from it for either one of these two purposes, the conductors which form a permanent portion of the fixture must be attached to the conductors concealed within the walls and issuing from the pipe outlets by bringing these latter through the pipe outlet, or from the space between the pipe and shell at the stiff joint, the sliding shell being adjusted by the set screw so as to cover it.

At the very beginning of incandescent work special interior revolving and flexible contacts were devised for swinging fixtures, or brackets, in contrast with the outside flexible spirals used in electric gas lighting. The necessity of making this point of junction more readily attachable to the different classes of fixtures, and especially the necessity for making an electrical separation between the body of the fixture and the outlet pipe (which in most cases connected with the earth), suggested the insulating joint, now in universal use.

"LIGHTING" AND "ILLUMINATION."

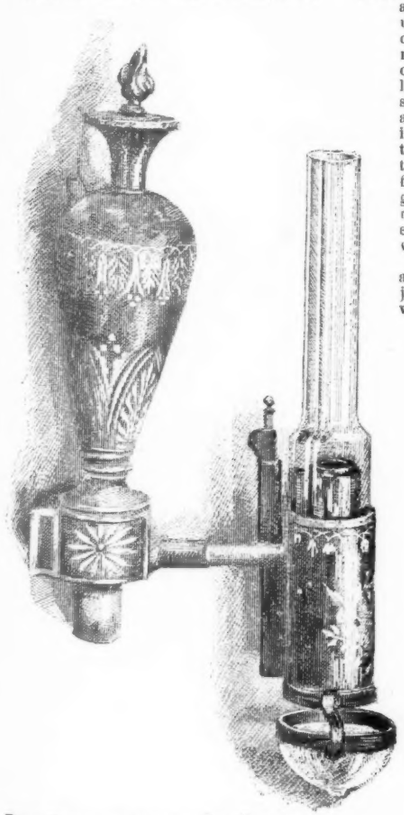
Light is both a necessity and a luxury, and it may, by the aid of artistic treatment in its arrangement, combine the necessity with the luxury to their mutual advantage.

Light, if produced for the sake of light alone, may, like the sun, be so intense that the source from which it emanates is too brilliant to be looked upon without discomfort.

On the other hand, it may be so arranged as—like a midnight sky seen through a clear atmosphere—to produce not only the desired illumination, but in addition, in the case of the incandescent lamp, an artistic embodiment possessing an intrinsic beauty, and more enjoyable from the absence of the combustion which is inseparable from other forms of artificial illumination, and freedom of placing in any arbitrary position that the fancy may suggest.

The question of artificial light may be considered from two standpoints.

When the source is close at hand, or the rays are confined or concentrated upon a relatively small space, as upon the page of a book from a reading lamp, upon a picture by proper screens, upon a statue by reflectors or upon a torpedo boat by projectors, the object may be said to be *lighted*.



FIRST STYLE OF ARGAND OIL BURNER—INVENTED BY M. ARGAND ABOUT 1785.

When the source is relatively far removed, and allowed to radiate its beams without hindrance, the area or surface affected may be said to be *illuminated*, inasmuch as space traversed without systematic concentration means diffusion of the rays.

COSTUME OF LAMP MAKER—FROM THE ORIGINAL ENGRAVING OF LARMESSIN.

To obtain the best results it is essential in all artificial illumination to secure uniform diffusion of light. This cannot be reached by the arrangement of a few extremely brilliant centers about the space to be lighted, because we cannot rival the sun; in fact, such an arrangement acts in itself to defeat the object in that we shall have a large portion of the light immediately about the sources, while the remainder filters, as it were, through space, growing weaker and weaker as it recedes from the sources, in obedience to the unvarying law of inverse squares.

Methods of artificial lighting will always be attended by some objectionable conditions; conditions which hold good with every form of light, however produced, as for instance it is of necessity too often placed in the line of sight. This difficulty must be met in the future by the simple expedient of a more minute sub-division and uniformity of distribution of lamps, never exceeding the practical standard of 16 or 20 candle-power, which the eye seems capable of enduring and utilizing.

From a structural and decorative standpoint, to secure the best results we must have lamps so small, as compared with those now in common use, that they give little light individually, but capable of being so grouped, massed or distributed, as to produce the desired effects and diffusion, without raising any point of space to a brilliancy disagreeable for the eye to rest upon.

There is another method of obtaining illumination, namely, by diffusing more powerful lights by means of shades and reflectors so arranged as to conceal the source from the observer, while distributing the rays. The wastefulness of this method is in most cases a bar to its use.

DECORATION BY MINIATURE LAMPS.

Up to the present time large units of electric lights have been depended upon to bring into greater prominence the beauties of surrounding objects, but in thus using it we fail to avail ourselves of the beauty which is inherent in the light itself when secured from myriads of small units, and thus lose more than half the effect for which we are striving.

Those grand creations of artistic genius which—in the form of the most sumptuous candelabra—lent to the palaces and salons of France during the eighteenth century, a splendor which was the pride of the society of all civilized Europe, are worthy of the study of the electrical engineers of to-day as an illustration of the field of decorative lighting into which they have hardly entered.

To excel them is within the bounds of possibility; to equal them would be an achievement worthy of our efforts.

Those of you who witnessed the display of small lamps at the electrical exhibitions of last year in this city, Minneapolis and Portland, Oregon, have a slight conception of how the results to which I have alluded are to be attained; but here steps in an old enemy. "Electrical Distribution," the old problem, has without even condescending to change her antiquated garb, once more opposed herself to artistic progress.

To achieve the entire success we meditate and which an exacting public will sooner or later demand, our tiny lamps should be independent of each other.

"Multiple Arc," which has been the rallying cry in the past, must be the watchword of the future; and in the "series" of years which may lie between us and success, the filament lamp achievement of 1879 must reach its ultimate fruition in a lamp and a system of distribution which will enable us to encompass with the electric light in multiple arc every form of illumination, whether for greater utility, or for commercial or decorative lighting.

It is, therefore, evident that the decorative features of artificial illumination which have heretofore been accomplished with gas and candles, must in the future be reproduced in the miniature incandescent lamp; for it is the small unit that gives pleasing variety in effective sub-division.

In banquet decorations, where thousands of candles must be replaced by incandescent lamps, it is obvious that the effect of infinite numbers can be attained only by means of these small lamps.

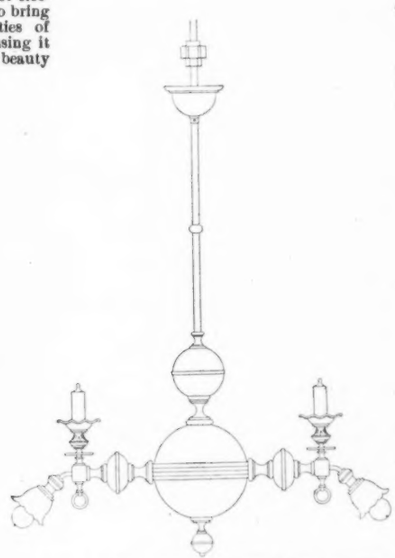
Considering the incandescent lamp then from this one of its many varied aspects, we are led to draw these conclusions: For decorative effect in illumination, the miniature lamp is destined to find a large and ever-increasing field. In order to occupy this field, certain means must be devised to admit of these lamps being used in multiple arc, as are the larger units; and while in themselves they are a thing of beauty, the best effects are to be obtained by multiplying their numbers.

Emerson has said that the most humble object becomes beautiful when exposed to an intense light. This is *lighting* only.

The lack of flexibility in the arrangement of gas resulting from heat and the products of combustion has prevented it from superseding candles where numerous star-like points are so placed as to enhance the beauties of the other features of the occasion, but the readiness with which we may arrange incandescent lamps, regardless of their position, opens to us vistas of decorative effect rivaling the jewel-studded caverns of the Arabian Nights in beauty and splendor.

This is *illumination* in its truest and most artistic sense.

DIOGENES WITH HIS LAMP SEARCHING FOR AN HONEST MAN.



A GAS AND ELECTRIC COMBINATION FIXTURE.

A Miniature Electric Railway in China.

A presentation has recently been made to H. E. Li Hungchang, by the managers of Tientsin Telegraph Administration and Telegraph School, of a miniature electric railway complete in every detail.

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ASSOCIATE EDITORS:
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ANNOUNCEMENT.

The ELECTRICAL REVIEW will be dated Wednesday of each week, instead of Saturday, beginning with this issue.

The latest date we can receive advertising matter will be the Saturday preceding. Our reading forms will close at noon on Monday.

The world does move. The ancient City of Mexico is to have an electric railway.

An electric road from New York to Chicago is proposed. This is a bold scheme, but there are no generic obstacles. The question is purely a commercial one—electricity can supply the power and speed.

We fear that the trolley car and the cable car have been outclassed in point of fatalities by the game of foot-ball. The editors of the vigilant and unsensational daily press might make a note of this. But they won't.

We haven't heard anything about the electric road between St. Louis and Chicago for a long time. Is this another scheme that has failed because of inefficient and over-sanguine management to be laid at the doors of electricity by the unthoughtful public?

The chief requisite now for successful competition in the electrical business is that the quality of goods should remain the same and the price should decrease. In insulating compounds especially, porcelain has taken the place of hard rubber and wood. Every day we hear of new devices for insulating purposes, to which porcelain is peculiarly adapted. Fibre is pressing close on the heels of other insulating materials, and with the advent of paper for telephone uses, fibrous material seems to come well in the van of popularity. Ingenious devices are now made in tubular form for the reception of fuse wire; in fact there are many parts of electrical apparatus which are now being built in fibre to the exclusion of both hard rubber or composition.

LONG DISTANCE ELECTRIC RAILWAYS.

An item has been going the rounds of the newspapers to the effect that a movement is on foot and the capital already pledged for an elevated electric railway from New York to Chicago. The electric railway has had a truly wonderful impetus and development within a very few years, but we can hardly credit any such statement as made by the item referred to. It is too long a step for our imagination to go from a street railway system of, say 10 or 15 miles length to a full-fledged trunk line nearly 1,000 miles between terminals.

Aside from the first cost of an elevated roadbed made as nearly an air line as the topography would permit—and this item alone would reach a stupendous figure—there are many things for which not even an approximate precedent exists. A direct current system would be out of the question, we believe. It is successful and satisfactory in our street railways whose limits of length are relatively short; but on very long lines the cost of copper would be prohibitive, even if the electrical pressure were put at its maximum safe point. On account of the dangers of short-circuiting armatures in railway service, we believe it would be unsafe to exceed 1,000 volts by the direct system. Hence the number of power houses would have to be so great that, adding their cost to that of the roadbed, it is difficult to see how an always timid capital could be attracted to the scheme. Not because of the mere objection of an extremely heavy figure of cost, but because of the uncertainty of the earnings being equal to the interest on the cost, without speaking of a profit to the stockholders.

With the alternating current of high tension and step-down transformers and motor-generators, the item of copper could be brought within reasonable limits, but the total cost of the plant would hardly be very materially changed.

The cost of roadbed would be so overwhelmingly the greatest item, that the others would almost sink into insignificance. Such an elevated railway would have to be a massive structure, whether as a masonry viaduct or a steel girder construction, in order to permit the extreme high speed at which trains would be operated. Probably a speed of 100 miles per hour could be maintained on the proper kind of roadbed. Such speed would not be permissible unless a pretty general level were maintained in the profile. That would mean frequency of very costly bridges and viaducts. Without going into details, we might dismiss the subject by saying that the present knowledge of electric railway construction is hardly advanced enough to take the risks and contingencies of an expenditure which would certainly reach into the hundreds of millions of dollars and possibly beyond them. Great and wealthy as New York is, and great and wealthy as Chicago is said to be, we do not think the combined available capital of the two cities could be induced to make the hazard.

Further, such a trunk line would necessarily have to depend for earnings principally upon through business. For many years passengers would be asked to pay high rates for the privilege of making the trip between breakfast and dinner, and we believe they would be glad to do so. But it would take a vastly greater number of passengers than now travel between the two cities daily to even make up the interest, without figuring operating expenses at all. There is usually no such hurry for freight transportation as would attract shippers to the electric road.

If the advocates of the high speed electric railway were to propose a line between New York and Philadelphia it would be a different matter. Here at once we have some approximation to precedent, the topography is favorable and the passenger traffic very heavy, and would be vastly increased by any system which would permit a business man to leave after breakfast, give an hour or so to business, and return in time for lunch. That is to say, if the distance one way were to be made in one hour. That would be practically 90 miles an hour, regularly. We believe our manufacturers of railway equipments would not hesitate to-day to undertake to construct and guarantee motor equipments, conductors, trolley devices and generating plant, if they were assured of suitable roadbed, track and rolling stock. And the roadbed need not be an elevated structure. Probably a depressed roadbed would meet the requirements for most of the distance and the cost then would depend mostly on the rails and their supports. An electric high speed railway between these points will be built before many years, we believe, and until it or some similar first-class system is built and operated successfully and profitably, we see little ground for the hopes of the promoter of the New York-Chicago electric elevated road.

RAPID TRANSIT ACCIDENTS.

Many reasons have been suggested why more accidents should happen on cable and trolley roads than on roads equipped with horse cars. Some of the suggestions have been plausible, but we now offer one which would seem to be rather reasonable. When a person crosses a street car track, and the car drawn by horses approaches, a certain sense of security is felt, for the reason that horses are living, and a wave of an umbrella is often enough to make them shy, and thus add another precious moment, which will often allow an individual to escape. But, in the case of a cable or trolley car, an unyielding, lifeless mass moves down on the person, and added to the difficulty of appreciating motion, while the body in transit comes directly towards one, we realize, perhaps too late, that nothing can stop this onward movement. Anyone who has seen a person run down by a cable car cannot fail to notice the absolutely vacant look as they watch the on-coming vehicle. It would appear that the peculiar phenomenon, that of the apparent growth of the approaching body, as time elapses, is, in a measure, responsible for this partial stupefaction. There can be no denying the fact that the sooner a life-guard is put on all cars, not equipped with horses, the less will be the danger to life and limb. It is true that experiments are now being carried on, but they should be hurried up. The cable car continues to run. Delays are dangerous.

CHEAP TELEGRAPH OPERATORS.

A Boston daily paper prints this significant story:

Two men are busy at or near a suburban railroad station, separated in their labor only by the width of the tracks and yard. One is an Italian who can speak but little English, and is employed in shovelling coal into the carts of a local dealer. He works nine hours a day, after which time he is his own master.

The other man is an American. He is an intelligent man, an experienced telegraph operator, and is station agent. Sixty or 70 passenger trains stop at the station daily, and nearly 100 more pass it without stopping. He is responsible for reporting by telegraph the time of passage of every train and for all train orders delivered at his station. In the course of a year he handles very nearly $40,000 in cash, and is charged for the tickets in his rack, and gives bonds for the faithful performance of his duty. He keeps a cash account, looks after freight bills and way bills, makes a daily record of freight cars left at his station, which is a junction point, giving their number and the lines that own them, their destination, hour of arrival and departure, in his care. He is expected to see that the station is kept neat and clean and inspects the switches. Moreover, he is responsible for the fidelity and activity of one signal man and a gate tender. He works part of Sunday and on week days may be called as late as 11.40 P. M.

He and the Italian coal shoveller are each paid $2 a day. And yet we wonder at the number of railroad accidents due to the mistakes of station agents and telegraph operators.

In our opinion, the moral is obvious and needs no elucidation.

The Executive Committee has selected Washington as the next meeting place of the National Electric Light Association, to be held February 27, 28 and March 1 next. The choice is an admirable one. While the capital of our country is not in any sense a commercial city, it will certainly attract a large attendance of electric light men.

CORRESPONDENCE.

OUR NEW ENGLAND LETTER.

The Joint Special Committee, of the Cambridge City Council, have reported favorably on the expediency of establishing a municipal electric lighting plant in that city.

The Holtzer-Cabot Electric Co., of 92 Franklin Street, this city, report a most gratifying increase during the past few months in the sales of their Magneto Twin Detectors. These instruments are already thoroughly well known to the trade and are constantly increasing in popularity.

The Campbell Electrical Supply Co., of 104 High Street, New England agents for the La Roche Motor Co., of Philadelphia, have just closed a contract with the Western Electric Light & Power Co., of Westboro, Mass., for a 1,000 light alternator of the La Roche type for central station work. This contract is particularly gratifying to the Campbell Company from the fact that the competition encountered was strong, the machine was selected on its merits, and is the first one to be installed in New England for central work. Now that they have obtained a footing in this section the outlook is favorable for a steadily increasing demand.

That Business is steadily improving along all the lines of electrical industries is readily demonstrated by even a casual tour of inspection. Everywhere present business is reported good and prospects for the future daily brightening. Supply houses find goods moving briskly, and manufacturers are closing contracts with more confidence than for some time past. While the improvement is nothing like so rapid and positive as the decline, which naturally could not be expected, it is still very marked, and sufficiently steady to denote a solid foundation and more healthy tone. Numerous large contracts for installations of various kinds are nearing completion, and the new year will undoubtedly usher in a period of increased prosperity.

The Most Absolutely perfect and efficient system of automatic electric fire alarms ever yet invented has just been completed by Mr. Gilman W. Brown, of West Newbury, Mass., and is now on exhibition in his work shop in that town. Mr. Brown is one of those rarely fortunate individuals having a strong natural talent in a certain direction, whose ample means allow him to indulge his inclinations to the fullest extent without let or hindrance. He is probably one of the most thorough and able mechanics of the day, and the workshop which he has built and fitted up to carry out his ideas as an inventor is one of the most complete private plants in the country. It represents an outlay of, at least, $20,000, and contains special tools and machinery of the highest order. Here he is able to turn out with his own hands anything he may want, and for mechanical perfection and elegance of finish I have never seen his work equaled. It is somewhat surprising to find a man of his ability and with surroundings such as his buried in the heart of a little town like West Newbury, five miles from a railroad, but he is essentially an inventor, and prefers the quiet of a country life. The fire alarm system which he has just completed, and which is perfect in every detail, is the outcome of years of hard study and patient labor for the attainment of a mechanical perfection which should, in every instance, and under all possible circumstances, fulfill the important and imperative duty demanded of it. That this state of perfection has been reached he is very confident, and the tests to which it has been subjected have fully demonstrated the soundness of his opinion. Mr. Brown has for some years filled the position of chief of the fire department of his native town and is thoroughly conversant with all the requirements of the service. A comprehensive technical description of the apparatus and its operation will soon be presented to our readers. In the meantime it will amply repay anyone interested in this line of work to spend a few hours with the inventor at West Newbury, and witness the system in practical operation.

November 25. H. G. T.

OUR WESTERN LETTER.

The Chicago Power Supply Company are at work on the first section of four miles of piping that will be laid in the alleys of the manufacturing districts on the West Side of Chicago, for supplying compressed air to motors.

Famous Locomotives.—The typical American locomotive, "No. 999," of the New York Central Road, and the English "Queen" pulled out of the Lake Shore station on Wednesday *en route* for New York. No. 999 is drawing the Wagner palace cars exhibited in the Transportation Building and two flat cars, one bearing the old DeWitt Clinton, and the other the old-time coaches. Behind the Queen were two exhibition coaches belonging to the London and Northwestern, and two Wagners. Day runs only will be made, in order that the people along the line may have an opportunity to inspect the trains. A number of electrical gentlemen, headed by Professor Barrett, were among the passengers.

The National Electric Plant.—The people of Eau Clare, Wis., appear pleased that Judge Bailey has confirmed the receiver's sale of the National plant to Peter Truax, for the sum of $7,500. The out-of-town creditors are not pleased. The affidavit presented by Mr. Truax stated that he was a creditor to an amount exceeding $50,000, and that he proposed to continue the manufacture and sale of electrical apparatus. A. L. Ide & Son offered $12,000 for the plant, but the court did not think the additional sum was sufficient to warrant a further complication of the matter. If $25,000 had been offered it might have justified the refusal to confirm, as it would cover additional expense were the receivership continued. As matters stand now the creditors will receive practically nothing, and yet it is only a repetition of the old story. Successful and efficient management is set aside at the whim of a director who desires to install his own favorites in office, regardless of the absence of special experience and of success in any line. The apparatus built by the National Company has won a good reputation, and the writer hopes that the management will again pass into the hands of the Hon. Geo. B. Shaw, and the new company soon regain its old-time popularity.

Chicago, Nov. 25. F. DEL.

"The Business Outlook is Improving."

A CHEERFUL LETTER FROM THE RHODE ISLAND TOOL COMPANY, OF PROVIDENCE.

TO THE EDITOR OF ELECTRICAL REVIEW:

We are pleased to note in the ELECTRICAL REVIEW of November 11, a communication from Mr. Sims, of the Armington & Sims Engine Company, of this city, in which he gives it as his opinion that the business outlook is improving; and we agree with the ELECTRICAL REVIEW in its comments upon Mr. Sims' letter.

Judging from our own experience, the general outlook is much brighter, and we are much encouraged at the promise of improvement. At present we are running with 160 men 45 hours a week.

Orders are coming in much better than last month or the month before, and collections have been prompt.

Our list of customers covers a large variety of industries—engine building, pump building, locomotive and car building, machine tool building, etc—and we can say frankly that from all information we can gain, and judging from the orders we are receiving, business throughout the country is improving and confidence is being restored.

Very truly yours,
RHODE ISLAND TOOL CO.,
WILLIAM C. DART.

Providence, R. I., November 20.

Fulford an Alleged Telephone Embezzler.

A dispatch from Indianapolis under date of November 26, says that at the request of the Indianapolis police, E. D. Fulford, superintendent of construction of the American Telephone and Telegraph Company, was arrested at Syracuse, N. Y., and will be brought back to Indianapolis. He is charged with embezzling from $40,000 to $50,000 from the company by issuing fraudulent vouchers. Vouchers were sent to Fulford in blank, and it is asserted that where a voucher should have been for a small amount, he often increased it to a large sum. Fulford is known throughout the country as one of the best American trap shooters.

Bank Officials Indicted.

Seven of the Madison Square Bank officials were indicted by the grand jury of New York Monday of this week.

The directors were Blaut, Soulard, Selover, McDonald, Kursheedt, Kalischer and Ottenbourg. These were for fraudulent insolvency. Other indictments were found against President Blaut for perjury, and against Blaut, McDonald and Selover for receiving deposits after the bank was known to be insolvent.

The many friends of Mr. R. T. McDonald, well known in electrical circles, are confident that he will clear himself of all these charges.

Wall Street and the Electrical Stock Market.

The financial situation, from a Wall Street standpoint, scored a material improvement during the week under review. Prices, as a rule, made a material advance and closed the week at the top and firm. We believe the market from now on for several months, as was the case of the London market after the Baring failure, will be discriminating. There will be a good demand for the gilt-edged stocks and bonds, while the mediocre and second and third classes will be comparatively neglected, although they will come in for a share of demand when older and more substantial issues are exhausted. The capitalist who keeps this fact before his mind, will certainly act intelligently in transactions in Wall Street.

General Electric was the center of interest during the last half of the week. The highest point touched on Monday was 40¾. The lowest was on Friday, it being 33½. The close to day was strong at 39½. The stock fluctuated through a comparatively wide range, was very active, large blocks being traded in. Up to to-day, barring the rallies, the tendency has been downward. Friday afternoon and Saturday there were pronounced evidences of support said to be purchases by parties who had inside information and believed in the property. There was the usual amount of talk afloat concerning the company and its affairs. On the whole, however, it is much more sensible than that which preceded it the previous weeks.

On Monday a little inside history of the decline of the midsummer was given by "Holland," a writer in the Philadelphia *Press*. He says that its peril last Summer was probably greater than that of any other industrial, and that the rich men who were associated with it met greater losses than in any other business investment. The losses must have aggregated $10,000,000. Of this amount Mr. F. L. Ames was said to have lost $3,000,000, and the anxiety which followed the decline in the stock probably caused his death. When the stock declined to 70 last Spring, a combination was formed to support it around that figure. According to the story, Mr. D. O. Mills was called upon for a quarter of a million dollars, and told if he did not furnish it he would be frozen out. He did not have the money and did not furnish it. It is known that Mr. Morgan went to the support of the property up to a certain point, to protect those who relied upon his name, and invested in the stock. About this time Mr. Morgan was said to have formed a new resolution, to the effect that henceforth he would never spend a dollar to maintain the price of a security upon the Exchange or put the price to any figure. Shortly afterwards a large block of stock was dumped upon the market, and it would be hard to find a capitalist who does not believe this stock was not Mr. Morgan's.

Concerning the business of the company at the present time we are in a position to say that it is fair and on a cash basis. Its supply business amounts to $100,000 gross per week. The company still refuses business necessitating credit. It has come down to a strictly manufacturing basis. It will have no receiver, but will be managed upon the most conservative lines until times warrant expansion. At the present time about 2,000 men are employed at Lynn five days a week, and about 1,500 men at Schenectady.

The weak feature about General Electric at the present time, as we understand it, is the fact that it has endorsed considerable paper for subordinate companies, some of which may grow troublesome. However, the situation in this particular is said to be better than it was and it is hoped, by the friends of General Electric, that it will not be called upon to meet any paper after all.

The Debenture five per cent. bonds sold down from 75 to 71 on the story that there would be a default December 1. The company officially states that this interest will be paid when due.

There has been a decided change in the aspect of Western Union since our last report. Wall Street is thoroughly imbued with the idea that stocks which are sure dividend payers are cheap at present prices. Western Union has been a steady five per cent. stock for years, and capitalists have been led to look upon it as a good investment security. For this reason there was good buying throughout the week. This had a tendency to squeeze a comparatively large short interest, all of which advanced the price from 86⅝ on Monday to 91⅛ to-day. The movement has been steadily upward with only slight reactions, and while there is much bearish sentiment in regards to the stock at present figures, the professional element in the Street will undoubtedly bow to the investment demand. The strength in the stock advanced the quotations in the Collateral Trust 5's to 105.

Edison Electric Illuminating, of New York, at a special stockholders' meeting, held on Monday, authorized the issue of the remaining bonds in the treasury under the mortgage of 1890, which provided for $5,000,000. The amount which will be issued is $1,750,000. Of this amount the company has sold $1,000,000 to pay for new construction and will retain $750,000 in the treasury. The bonded indebtedness of the company at the present time is as follows: $688,000 of the bonds have been converted into stock; $750,000 of the bonds remain in the treasury, and the balance, including the new issue outstanding, is $3,562,000. These bonds advanced 1¼ per cent. during the week on an investment demand. The stock was traded in in a small way at 95 and 96.

We hear a report that the trolley lines of Brooklyn are negotiating a consolidation.

The Bell Telephone output for the month ending November 20 showed a decrease of 3,755 instruments. The number of returns were 2,555; net loss was 5,300.

On the Boston Exchange, Bell Telephone showed a slight weakness between 187 and 189. Erie telephone was quoted at 41 bid, 42 asked. General Electric, preferred, declined from 76, early in the week, to 62 Friday. New England telephone, on exceedingly limited sales, sold at 53, 54 and 55, the latter being the closing. Fort Wayne Electric, par 25, was quoted at 4 bid, and 4⅛ asked. Westinghouse Electric, first preferred, 45 bid, 46 asked; assenting 24½ bid and 25⅛ asked.

New York, November 25.

PERSONAL.

Captain Geo. N. Stone, the well-known telephone man of Cincinnati, was recently in Pittsburgh.

Mr. W. J. Clark, of the General Electric Company's Cincinnati office, was in New York last week.

Superintendent Morris W. Mead, of the Bureau of Electricity, Pittsburgh, Pa., was among last week's New York visitors.

Mr. A. C. Fletcher, formerly of the Fletcher & Fletcher Electric Company, of Cleveland, O., after a two years' retirement from business, renewing his health in Colorado, has again returned to Cleveland and organized a newspaper advertising business under the name of A. C. Fletcher & Company. Mr. Fletcher is a gentleman of experience in this field, and the ELECTRICAL REVIEW extends best wishes for his success.

L. H. Rogers, of the Brush Electric Company, Cleveland, Ohio, is in New York endeavoring to install on top of one of our tall buildings an electric search light for advertising purposes. The idea is a kind of gigantic magic lantern scheme for throwing pictures and signs on the clouds or against the blank walls of buildings. A similar scheme was proposed in London a short while ago. Mr. Rogers placed the immense search light on top of Mt. Washington, and claims that if he is successful in his present plans, it will be the only outfit of the kind in the United States.

Mr. Fred. W. Royce, of Washington, D. C., is, no doubt, well pleased, and is to be congratulated that his efforts to bring the Electric Light Association to his city were crowned with instant success. He will be further pleased to learn that in an informal talk of the members and visitors after the adjournment of the Executive Committee it was unanimously decided to make his unique and always interesting catalogue the "organ" of the association for this meeting. This is an honor that any publisher might take pride in, and we felicitate this able catalogue editor, who is never so happy as when providing cheer and comfort and cashing drafts and checks for visiting electrical men and brethren of the journalistic fraternity.

Trolley Combination in Brooklyn.

It is reported that all the surface trolley roads of Brooklyn, N. Y., will be combined into one company with an immense capitalization. In accordance with the plan there has been organized the Brooklyn, Queens County and Suburban Company, and a certificate of incorporation has been filed with the Secretary of State. The capital stock is $15,000,000, consisting of 150,000 shares of $100 each. Upon this stock a tax of $18,750 was paid into the State Treasury. The company is to continue in existence for 100 years. The road is to be a street surface road, about five and a quarter miles in length, in Queens County.

The directors are as follows: Frank Bailey, Edward Johnson, George H. Southard, Henry E. Hutchinson, Frederick T. Aldridge, Julian D. Fairchild, all of Brooklyn; Cassius M. Wicker and Francis P. Lowery, both of New York city, and Henry T. Bragg, of Yonkers.

At a meeting of the directors, held last Saturday, the following officers were elected: Henry E. Hutchinson, president; George H. Southard, vice-president; Henry Bragg, secretary, and Frank Bailey, treasurer.

Electric Light Association to Meet at Washington, D. C.

THE CAPITAL OF THE UNITED STATES SELECTED AS THE NEXT MEETING, TO BE HELD FEBRUARY 27, 1894.

The Executive Committee of the National Electric Light Association met at the Hotel Lafayette, Philadelphia, Friday afternoon of last week. The following members were present: President, E. A. Armstrong; secretary, Geo. F. Porter; master of transportation, C. O. Baker, Jr., and Messrs. H. H. Fairbanks, John A. Seely, H. J. Smith, E. F. Peck, A. J. De Camp. Others present were Mr. Burleigh, of Camden, N. J., and Messrs. R. B. Corey, Geo. M. Phelps and Chas. W. Price, of New York.

The chief object of the meeting was the selection of the place and date of the next meeting of the association. San Francisco, Seattle, New Orleans, Philadelphia, Atlanta and Washington, D. C., were named and discussed. The advantages of Atlanta were presented by Mr. Phelps and Mr. Seely, while the hospitality and Midwinter Exposition of San Francisco were urged by Mr. Price as strong elements in favor of that city, should the association decide to take a long trip.

The opinion of all, however, seemed to be that there would be a larger attendance at Washington, D. C., than at any of the other places named, and that city was finally unanimously selected. The letter from Mr. Frederick Royce, an esteemed Washington member of the association, breathing warm, southern, cosmopolitan welcoming words, had great weight with the committee.

The date selected was the third Tuesday in February, 1894 (February 27), and the president was authorized to appoint a committee on arrangement to select headquarters, etc., etc. It was decided not to have an exhibition of apparatus under the auspices of the association, but all manufacturers will be welcome who can to exhibit during the meeting. The president was also authorized to appoint a special committee on programme.

On motion of Mr. Seely a committee was appointed to investigate and report the advisability of the Association engaging permanent and official headquarters in the new Postal building, New York city. Messrs. Seely, Peck and Baker were appointed on the committee.

The president appointed as the committee on arrangements, Messrs. C. O. Baker, Jr., Fred. Royce, Sam Bryan and M. J. Francisco, and empowered the chairman to increase the number as he deemed necessary.

The committee on programme was made to consist of Messrs. A. J. DeCamp, Chas. W. Price and H. H. Fairbanks.

After adjournment, the committee and others present, were entertained at a most palatable dinner at the Union League Club, by President E. A. Armstrong, where they enjoyed a very delightful evening.

International League of Press Clubs.

The Governing Board of the International League of Press Clubs met at the Hotel Imperial, New York, Thursday afternoon of last week. President John A. Cockerill, of the *Morning Advertiser*, occupied the chair, and others present were Messrs. Wm. V. Alexander, Boston *Transcript;* P. C. Boyle, *Oil City Derrick;* H. D. Vought, Buffalo *Courier;* Thos. J. Keenan, Jr., Pittsburgh *Press;* Chas. Grasty, Baltimore *News;* Wm. Berri, Brooklyn; L. F. Thoma, Dr. John Frederich, Chas. W. Price, of the ELECTRICAL REVIEW; Mrs. Eliza Archard Conner, of New York, and Mrs. Sallie Joy White, of the Boston *Herald*. A committee was appointed to arrange for the next meeting of the League, which is to be held in Atlanta, Ga., the latter part of April, 1894. Mr. Keenan was made chairman of this committee. Other committees relating to the work of the board, the extension of the League, etc., were appointed, all to report at the next meeting.

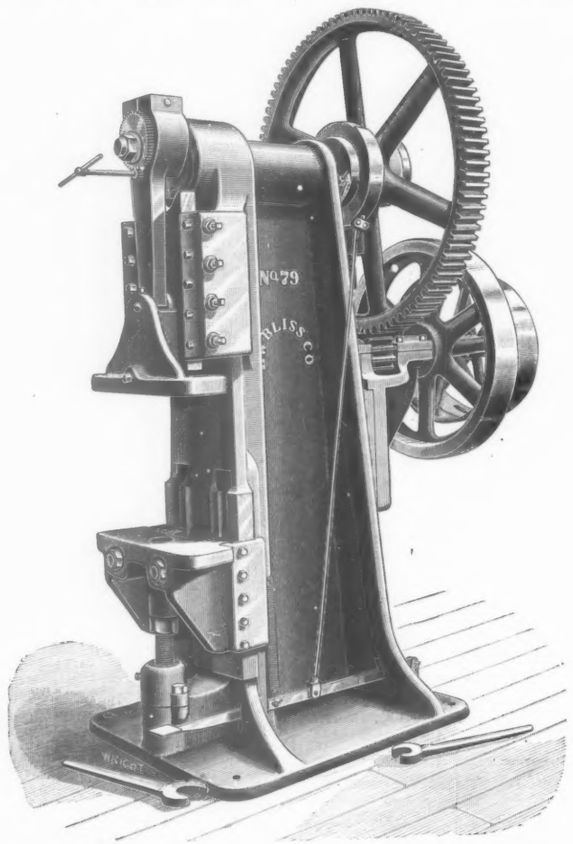
The idea of forming a beneficiary insurance association among the clubs of the League was favorably discussed, and a committee, with Mr. H. D. Vought as chairman, was appointed, to report at the next meeting.

It was predicted that the Atlanta meeting would be the largest and most interesting ever held, and a particularly interesting and important programme is promised.

President Cockerill, of the committee on the Home for Aged and Infirm Journalists, reported at some length on the site which the committee had selected, and which Mr. Remington Vernam had donated to the League. It is located in New Jersey, in a beautiful and healthy section, a few miles northwest of Paterson. The committee were thanked for their efforts, and all present expressed their favor of the site selected. The Board adjourned to meet again in February.

The E. W. Bliss Company's Reducing Power Press.

The annexed illustration shows a long stroke press, recently designed by the E. W. Bliss Company, for redrawing, shaping, trimming and other operations on deep sheet metal articles. It is provided with a screw adjustment for the table, which permits the use of dies, varying greatly in height, and also has an eccentric device in the pitman, which facilitates making the finer adjustments required for the tools. The press is provided with an automatic clutch, controlled by foot power, so as to have the slide stop automatically at the top of stroke, unless continuous strokes are wanted, in which case the foot is kept on the treadle. The machine is made with or without gearing. For broaching castings or forgings, where a very slow movement is required, it is frequently constructed with back gearing or much greater ratio than shown, in which case a friction clutch on the driving shaft is used instead of automatic clutch on the crank shaft. The press, as shown here, weighs about 8,200 pounds, has a maximum distance between the bed and slide of 15½ inches, an adjustment for this space of 10 inches, and a stroke up to eight inches. The ratio of gearing is one to seven and one-half, and the number of strokes usually made per minute 40. Further particulars can be obtained from the manufacturers at 133 Plymouth street, Brooklyn, N. Y.



THE E. W. BLISS COMPANY'S REDUCING POWER PRESS.

GENERAL NOTES.

Work on Boonsboro-Keedysville, Md., electric railroad has commenced.

Middleboro, Mass., is to have an electric street lighting system. The price of the plant is not to exceed $63,000.

The Southern New England Telephone Company has recently ordered 190 miles of wire for the metallic circuits of the Norwich, Conn., division.

It is understood that Arbuckle, Ryan & Company have purchased the corner lot at Ontario and Monroe streets, in Toledo, O., and will erect a large four-story building there for the manufacture of traction engines.

The Colorado Telephone Company has not allowed the hard times to interfere with its progress, and has just completed a copper metallic circuit connecting Fort Collins, Greeley, Berthoud and New Windsor with Denver, Colo.

The Craig Arnold Electric Company, of Chester, Pa., which was sold out last week, netted very little for the creditors. Mr. Craig Arnold bought in nearly everything, will start the works and they will be known as the Arnold Electric Company.

A new switch board of 400 metallic circuit capacity was put in the Woonsocket, R. I., central telephone office last week. It replaces the old switch board, which was of only 100 circuit capacity. The new board was made at the works of the Chicago Switch Board Company, Chicago, Illinois.

After six months' delay the Alexandria, Va., city council has granted to the Washington, Alexandria and Mount Vernon Railway Company the right to pass out of the city by either King, Cameron or Payne streets in order to run a track north or west. The proposal to use an additional street has not been agreed to.

The Richmond Railway and Electric Company has begun work upon its new power house, to be erected upon Brown's Island. As soon as the structure is completed the Seventh street plant will be removed to it. The iron span bridge of the company from the foot of Seventh street to the island has been finished.

Judge George C. Wing, of Auburn, who is one of the heaviest bondholders in the electric street railway company at Battle Creek, Mich., has asked the United States court for a receiver. The road is bonded for $100,000, and has never paid interest on the bonds. Several New England capitalists are interested.

The astounding news comes from Indianapolis, Ind., that on November 24th the Citizens' Street Railroad Company was informed of a plot to blow up its power house at Tennessee and Georgia streets with dynamite bombs. The plan was to place seven bombs about the building, with fuses timed to explode after two o'clock in the morning, when all employees would be off duty. One of the conspirators got frightened and gave the information. The company has been discharging old employees very rapidly of late.

The plant of the Haverhill, Merrimac and Amesbury Street Railway, between Newburyport and East Salisbury, is now equipped for electricity. Superintendent Wentworth had a gang of men at work last week making the necessary changes on the tracks at Newburyport and stringing the overhead wires from the bridge to the trolley wire of the N. and A. Railroad on Merrimac street. Electric cars were running Saturday on the line between three and four o'clock for the first time between East Salisbury and Newburyport. The running time from Amesbury to Newburyport will be 45 minutes.

The Milwaukee Electric Power and Light Company's plant was to have been sold last week to satisfy a mortgage for $10,000 held by George Hiles. A half-hour before the time for the sale, friends of the company walked into the office of Mr. Hiles' attorney and quietly planked down $10,000, thus preventing the sale. There has been a reorganization of the company and a number of new men have gone into it, including ex-Alderman Adler and other well-known gentlemen. The capital stock will remain the same—$100,000. The new company has not yet decided what it will do in the future, but probably it will extend its plant and continue it as an independent institution.

The Effect of Arc Lights on Street Car Conductors.

A correspondent in one of the daily papers states that since electric lights were substituted for the gas lamps in Second avenue the conductors on the surface cars have found it difficult to locate their whereabouts at night. They are very often in darkness, paradoxical as it may seem.

In the days of the gas lamps they were able to read the names of the streets as they passed by the corners and know just where they were at, to make use of Senatorial parlance, but at present the glare of the electric light, strong as it is, affords no means to the conductor of distinguishing the number or name on the darkened lamp post. In consequence they are subject to much abuse.

I rode uptown on a Second avenue car recently, and personally saw the necessity of having some means by which the streets can be distinguished at night. People constantly boarded the car and requested the conductor to let them off at a certain street. In consequence the conductor has to mentally follow every street as he goes along. This, with the many other duties he has to perform, does not make his trip a very pleasant one.

"It would not be so bad if we were not constantly abused," said the conductor to me. "But when people ask me to let them off and I happen to overlook the exact locality, because I am unable to see the name of the street, I've got to stand a good deal of abuse, and people won't take explanations, you know. Of course, to an old conductor, who knows nearly every street along the route by its looks, this failure to have names that can be seen is not noticed much, but to a new conductor its pretty hard."

The First Three Phase Transmission Plant in the United States.

An excellent example of a successful power transmission plant operated on the three phase system is that recently installed at Redlands, Cal., by the General Electric Company. It is the first plant in this country in which this system is employed, and its completion marks a new era in electrical history.

In few regions is water power more appreciated and electrical power transmission more necessary than in Southern California. For irrigation alone a water right there is better than most gold mines, for in spite of its marvelous sub-tropical climate artificial irrigation is a necessity almost everywhere. Without it much of the country would be barren and forbidding. With it it becomes a fertile garden spot. Add to this indispensable irrigation the possibility of using the same water for the distribution of power over a region where coal is from $8 to $12 a ton, and the importance of electrical power transmission is evident enough.

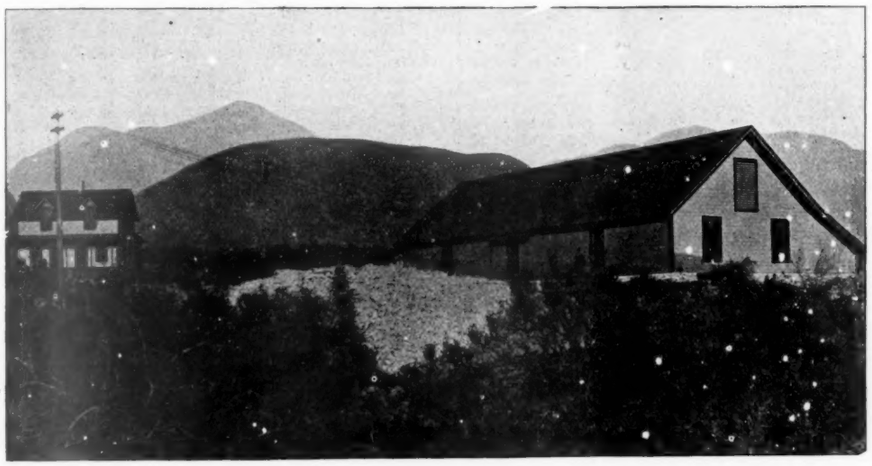


FIG. 1.—POWER HOUSE OF THREE PHASE TRANSMISSION PLANT AT REDLANDS, CAL.

The first water power in Southern California to be utilized for the distribution of power, as well as lights, is that situated at the mouth of Mill Creek Cañon, nine miles from the city of Redlands, one of the most flourishing of the younger cities of the State.

Less than two years ago a few of the public spirited citizens of Redlands saw the chance of utilizing the fine Mill Creek power and organized a company, chief among the members of which were Messrs. George M. Crafts, H. H. Sinclair, F. G. Feraud and George B. Ellis, who have in other ways played an important part in the development of the city. The enterprise was rapidly pushed forward, and about nine months ago a contract was closed with the General Electric Company for the necessary apparatus.

The hydraulic part of the installation is of more than usual interest. Mill Creek is a fine and unusually reliable mountain stream that springs from the slopes of mountains San Bernardino and Grayback, the two loftiest of the Sierra Madre range. The main body of the stream, and a convenient intake, was found near the mouth of the Cañon, and by a comparatively small deflecting dam of masonry, 40 feet long, and head works, it was possible to turn the water into a tunnel 160 feet in length, cut through the rock, and thence into a heavy steel pipe line, which was brought down the stream a distance of 7,250 feet, where was obtained a convenient site for the power house. At the end of the tunnel is a sand box 75 feet long by 25 feet wide to catch any sediment before the water can enter the pipe line. At this point the fall is in the neighborhood of 353 feet, giving exactly 160 pounds pressure to the square inch in the receiver that terminates the pipe line, which can deliver 2,400 cubic feet of water per minute.

The power house shown in Fig. 1 is for the most part an excavation not far from the bank of the creek, made in a singularly heavy rubble composed of large water worn stones very compact and dry. The roof is erected on very low side walls, and under the lean-to on the right is the wheel pit, with the receiver and Pelton wheels. The wheel shafts extend through iron shutters, set in windows in a massive rubble retaining wall that bounds the wheel pit, into the dynamo room, where they are directly coupled to several machines. This dynamo room contains the following apparatus, as may be seen from Fig. 2, which gives an excellent view of its interior. Two 250 kilowatt, ten-pole, three-phase generators, delivering current directly to the lines at 2,500 volts between lines; two D-10 exciters, each capable of energizing the fields of both generators, and one 50-light, 2,000 candle-power Thomson-Houston arc dynamo. With the stream at its lowest, 800 horse-power is developed at the generators. Room is left and foundations are in place for a third three-phase generator and a second similar arc machine. The large generators run at 600 revolutions, give 6,000 alternations per minute, and have a rated output of 100 amperes at 2,500 volts. The general arrangement of the station was planned before the contract for the apparatus was let (and, in fact, before the character of the machinery was determined), substantially, according to the designs of the late A. W. Decker, whose recent death was a substantial loss to the electrical interests of the Pacific Coast.

To each of these large machines just mentioned, a Pelton wheel is directly coupled, the three-phase generators being supplied with 200 horse-power double wheels, each operated by a double nozzle.

The regulation of the hydraulic power is by the ordinary differential nozzle operated by Pelton differential governers driven from one of the exciter shafts. A second small differential governor, driven from the other exciter shaft, steadies the action of the first by regulating the exciter wheels. The water having done its work is discharged into a ditch and utilized for irrigation purposes.

On the side of the dynamo room opposite the dynamos are located the switch boards. The chief interest of these lies in the three-phase switch board for the two big generators. This is elaborately devised to meet every condition or combination that it might be desired to make with the two machines, and the two circuits that run from the power house. Either machine can be thrown on either circuit, and both machines in parallel on either or both circuits. At present the parallel connection is chiefly used in shifting over the load to obtain perfect continuity of service. A six-ton traveling crane permits ready handling of any of the machinery.

The interior of the station is a model of its kind. Particularly to be noted are the excellent foundations, which are carried deep down into the solid rubble and are built up with a liberal supply of cement, sharp gravel and small stones. In the upper portion of the foundation equal parts of cement and gravel are used, and the top layer is of pure cement.

To this smooth surface is bolted a frame work of oak about three inches thick. On this rests the dynamo, which is secured to it by bolts firmly screwed up and bedded in sulphur.

The result of this careful foundation and excellent alignment of shafts is, that the large generators run without even a tremor at the bearings.

The whole fitting of the station is admirable, and the same care is extended to the little house of the engineer (seen in Fig. 1), which is lighted from one of the exciters, and is to be furnished this Winter with electrical heating and cooking apparatus.

From the power house are run two three phase circuits, each composed of three 00 B. & S. wires. One of these runs to the company's office at Redlands, a distance of seven and a half miles, and from thence is distributed over the city for lighting and power purposes. On a substantially built pole line the other extends to Mentone, four and a half miles, where is located the artificial ice plant of the Union Ice Company.

In this plant is installed a self-starting, 150 kilowatt, triphase, 750 revolution, 6,000 alternation, synchronous motor, belted through the medium of a countershaft to two large compressors for the ammonia, a circulating pump for the compressor jackets, a force pump to supply water for the ice, and a small elevator for handling the ice. In order to ascertain the point of synchronism, a Thomson acoustic synchronizer is employed, and gives unqualified success. The ice plant is of the so-called "pipe" type, and the freezing room and the condensers contain nearly 20 miles of three-quarter inch iron pipe, in testing which the motor was stopped and started, at short intervals, for several weeks. The operation of the ice plant is continuous, the load being on the motor 24 hours a day and barring accidents, 365 days a year. The motor plant at this point is likely soon to be increased to keep up with an increase in the plant.

From the main Redlands circuit a number of lines are taken off for the ice plant and also for the neighboring town of Mentone. There are now in operation 30 arc lamps, besides over 1,000 16 candle-power incandescent lamps, distributed over three legs of the circuit. A number of small induction motors without commutators or collecting rings are to be installed before the beginning of next year, to meet the demand already created by the success of the plant. The transformers are very similar to the ordinary General Electric Type T transformer except that they are designed for 50 cycles per second and to reduce the pressure from 2,200 to 110 volts. So far as possible rather large transformers are used with comparatively long secondaries. These are used only directly at the point where light and power are delivered.

No trouble whatever has been experienced from any unbalancing of the lighting lines. In fact, shortly after the plant was started up, the largest single block of lighting in the city, wired for three circuits, had these circuits worked for several nights on two legs of the triphase generators pending the setting up of the third transformer; and, although the lights from these two legs were set in adjacent rooms where both would be seen at once, not the slightest trouble from unbalancing was evident.

The first generator reached Redlands September 1, and September 7 incandescent lamps were turned on in Redlands, where arc lamps had been previously working since the latter part of July. September 13 the motor at the ice plant went into commercial operation. The whole plant has been running steadily and doing good service ever since.

The plant has now been in thoroughly successful operation, and the General Electric system and apparatus has given entire satisfaction, for more than two months, and with the progressive and business-like management of the company, bids fair to be not only a successful power transmission, but an eminently satisfactory investment. Its operation has been singularly free from difficulties of every kind, and it appears to be a thorough demonstration of the adaptability of the General Electric Company's three-phase system to the work of transmission for both power and lighting.

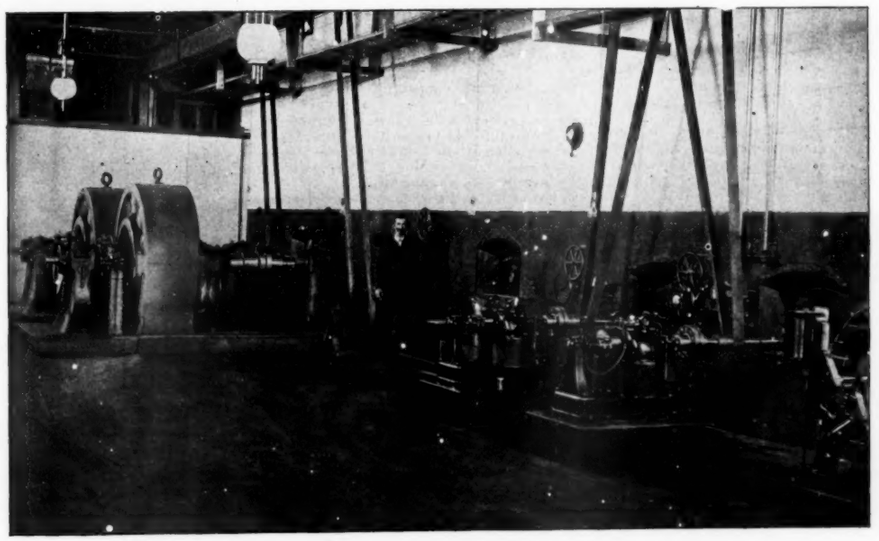


FIG. 2.—DYNAMO ROOM OF THREE PHASE TRANSMISSION PLANT.

Suit On a Telegram.

A suit to recover $1,000 from the Western Union Telegraph Company was begun on November 11 in the Circuit Court in Jersey City by Lawyer Alexander Simpson, on behalf of John W. Humes, a reporter. Early last Summer Humes was summoned by letter to Los Angeles, Cal. The letter was followed by a telegram telling him not to come. Humes claims that the telegram was not delivered to him until a month after it was sent. In the mean time he spent $1,000 traveling to California and back, and he believes the Western Union Company ought to pay his expenses. The suit was placed on the calendar for trial.

The Primary Action of the Galvanic Current.

IT INCREASES THE AMOUNT OF OZONE IN THE BLOOD AS SHOWN BY CHEMICAL TEST OF THE BLOOD IN THE ARTERIES—WITH A THEORY OF ANIMAL ELECTRICITY.

BY J. MOUNT BLEYER, M. D., AND M. MILTON WEILL, M. D., OF NEW YORK CITY.

[From the archives of the Smithsonian Institute.]

(*Concluded from page 168.*)

Undoubtedly, Schmitt, Houzeau, Meisner, Kühne and others were right in their assumptions, but it seems to us that they did not probe deep enough for a solution of the possible origin of this transformation of neutral oxygen into ozone within the human economy. It was due to the polarization of the atoms of the neutral oxygen, but how did it come about?

We have assumed, in starting out upon the experiments, the results of which form the title of the paper we have the honor of presenting to your consideration, together with the more exact details which we hope to announce at some future day, step by step, with the view of adding some light to the question, that this generation of ozone admits of a satisfactory scientific explanation.

During the years that my colleague and myself devoted to the study of ozone within the body, we have always regarded it with awe and veneration. We have woven theory after theory only to find that the strands broke precisely within the limits of the reasoning of the great observers to whom we owe all we know of ozone, and that to us as physiologists is indeed little.

That ozone can be found in the blood, nourished by gases that contain no ozone, is a fact beyond dispute, yet the problem of its generation is a problem that at first sight offers no easy solution.

In looking over the field of possible sources to explain this source of the formation of ozone, it fastened itself upon us that one great factor that might afford an explanation had been overlooked. It was animal electricity, and we have tried to explain its function. There seems to be but one deduction to draw from the most careful observation, and that is, that it is animal electricity upon which not only the polarization of the atoms of oxygen, but all molecular polarization and chemical action in the body depends.

We believe that the transformation of oxygen into ozone within the body is brought about by this very animal electricity, which polarizes the neutral oxygen to such a degree that a portion of the atoms re-arrange themselves, attract and repel each other under this polarizing force until we get the ozone which we detect upon analysis. The function of the ozone is apparent to all of us. It gives the oxygen increased power to form combinations with the tissue elements and promotes oxidation.

This polarization of the oxygen seems to take place just as the gas touches the tissues where the conditions are favorable to such an action, and where it closes circuit with electricity in the human frame. The unaffected molecules of oxygen under the vigorous spurring of this ozone become vitalized, as it were, and at once begin the search for their affinities in the tissues and enter into combination with them.

The proof of this reasoning seems to us to be apparent from the fact that we have been able to appreciably increase the amount of ozone in the blood by passing very weak currents of galvanic electricity through the body, and it is the underlying theory upon which we based our experiments and which we hope to make clear to you.

Before dismissing this portion of our paper and passing over to an account of our experiments upon the blood of the living animal electrified by a current of galvanic electricity, permit us to advance another theory which we regard as justifiable from our findings, and we do so only in the hope that it will give rise to careful discussion, for it is at variance with some of our pet physiological theories; it is

That oxygen in the blood, stimulated by the polarizing power of animal electricity, and more so under the stimulus of the galvanic current, enters into combination with the haemoglobin of the corpuscles with a partial transformation into ozone, and that in losing its combining bonds it undergoes a further partial transformation into ozone.

EXPERIMENTS ON THE ELECTRIFIED ANIMAL.

This brings us to a record of the experiment upon the living animal with the galvanic current.

The animal chosen was also a rabbit, which was prepared by being fed on fresh vegetables for several days. He was in prime condition and was allowed to run at large until he was required for use. The batteries, two of the ordinary 24 cell medical machines of the Edison-Lelande pattern were used. The batteries were carefully tested cell by cell, and the current measured with both volt and mil. ampere meter. A coil of a resistance of 400 ohms, which had been placed in the circuit, was removed after the measurement had been taken, and we decided upon a current of a strength not to exceed 40 mil. amperes.

Two cuts, about half an inch apart, were made into the skin of the animal, and into these and for a distance into the body of the muscle, the platinum electrodes used in the previous experiment were inserted and a current of 20 volts turned on. The meter showed 44 mil. amperes. This dropped quickly down to 41 mil. amperes. The reading of the meter, during the five minutes that the current flowed, was as follows:

1 minute	40.5	mil. amperes.
2 "	38.	"
3 "	37.+	"
4 "	35.8	"
5 "	35.—	"

At the end of five minutes both carotids were cut through, and 35 grammes of blood were drawn into a sterilized glass vessel, and defibrinated as before with sterilized glass rods.

It was observed that the blood was of a brighter scarlet hue than that which flowed from the arteries of the unelectrified animal. Exposure to the air, while the process of defibrination was going on, did not affect the bright tint. Defibrination too, was not so easily affected, and the fibrin slowly gathered around the rods.

Seven minutes after the blood was shed a gramme of the fresh serum was diluted with two grammes of distilled water and subjected to test with both guiac and starch iodide. The reaction in both instances was almost immediate, a trifle more active with the guiac. The ring of blue around the drops of blood was more pronounced and much deeper, and kept on deepening both in the open air and under the bell jar as had been done with the blood from the first animal killed. At the end of 20 minutes the test papers, those saturated with guiac and starch iodide, three of each variety being exposed to the air and a simular number under bell jars, indicated the termination of the action, and they were taken out and carefully compared with the test records of the first experiment which had been preserved in air-tight tubes. The blue ring was, even upon the most superficial examination, found to be several shades deeper, and the ring of reaction was more spreading, in some of the drops, almost half an inch wide and distinctly visible to the line of demarkation of chemical action. The fibrin also gave like results. A far larger amount of iodine had been set free in these tests than in the case of the first analysis. The quantity of ozone to give such reaction, according to a most conservative calculation of both Dr. Dittrich and my colleague, was estimated to be certainly three times greater than that which gave the reaction from the normal blood.

The increase in the amount of ozone was astonishing and far beyond our expectations. We had anticipated some difficulty in determining the increase if it proved to be trifling, but here we were met by a quantity far in excess of what we had hoped to find in the event of the most successful termination of our searching.

The action of the current on the oxygen, in both plasma and corpuscle enmeshed fibrin, was evident in the transformation of a portion of it into the more vital form of O_3. That the current had accomplished this transformation, astonishing as it proved to be, was readily to be explained, but not so with the ozone in the normal blood. There was but one explanation for this, the polarizing action of the animal electricity.

OUR PLAIN VIEWS REGARDING ANIMAL ELECTRICITY.

The existence of animal electricity is acknowledged. The origin and action, however, are the points upon which electro-physiologists are not quite clear. Those who have given the subject some consideration dismiss it by establishing its connection between chemical action, heat and animal electricity. They rest content in discussing the three conditions without attaching the slightest importance to the precedence of one or the other of them. Chemical action, we are told, evolves heat, and so tissue metamorphoses and oxidation go on. They are satisfied with the evidences of the existence of animal electricity, that it can be measured, and that it is one of the great trinity upon which life rests.

It is in view of this condition of the investigations upon this question that we approach it with much trepidation and fear lest we be charged with being too radical in our deductions; we can almost see doubt written upon the faces of many of this distinguished gathering, and we can almost hear you say: "Well, are you going to settle the question?" Settle the question or not, still we have the boldness to advance a probable solution of the problem, and we ask you to follow closely our experimentation and the deductions we have drawn and based our opinion upon.

We will not take up your time by rehearsing the observations of the various electro-physiologists who have enlightened us in animal electricity. To do so, we would, in fairness to all, be obliged to begin with Matteucchi, and so on up to the present day, without omitting a single one, for each of the observers has welded a link in the chain of result, and to leave out a link would mean to destroy the integrity of the chain.

Let us for a moment consider the observations of Dutrochet, and we may get a clue to the true function of animal electricity. He observed that if the positive pole of a battery be dipped into pure water, and the negative in gum water, endosmosis continued more energetically.

Onimus later on discovered that with a reversal of this order of pole, endosmosis too was reversed. It is but fair, reasoning again by analogy, to assume that the electricity in the body exercises precisely the same physico-chemical action. We have already called your attention to the observations of Gay Lassan. Whenever the so-called catalytic action takes place in the living tissue, is it not equally fair to assume that animal electricity is the prime mover? Can there be any question that electricity, galvanic, with its electrolytic powers, the ready manner with which it decomposes the salts, coagulates albumen in the vessels of our laboratories, has a like action on the tissues and fluids of the living organism?

It is apparent, we hold, that animal electricity not only influences the whole system of nutritive operations, but also directs them.

Time and again we have electrified animals and observed that under certain conditions of electrification, the animals threw off a greater amount of urea and carbonic acid than under ordinary conditions.

Urea and carbonic acid! and what is the significance of such an increase in the waste products?

Nothing more than, and nothing short of, increased chemical action, increased tissue metamorphosis, the increased evolution of heat; but the electricity, the animal electricity—that remains unaccounted for.

Dutrochet and Onimus showed us the action of the anode and the cathode in endosmosis, and left us to apply it to the physiology of nutrition. Now let us do so and account for the function of animal electricity if we can. As we have already intimated, the order of action is animal electricity first, and why, because we must have polarity before we can have chemical action and its natural result, heat.

Subject a solution of the iodide of potassium to electrification and you free the iodine. Inject a quantity of this fluid into the blood of a living animal and then subject the animal to electrification, and in a very few minutes starch papers, held in contact with the parts surrounding the positive pole, will indicate that the iodine is set free by the action of that pole. Note the transfer of the chemical action from the laboratory to the living body; are the two not singularly alike?

Unfortunately we have not been able to isolate the poles of animal electricity, and hence it is that our tests on animals similarly injected, yet not electrified, give us such indistinct reactions, that we hesitate to announce them as positive results.

Yet all this points to the one conclusion, and the one deduction, that animal electricity comes first; that is the prime factor in all the processes of change, of chemical action, or otherwise, within the living body. That without its stimulus of polarization, no chemical action can be called into life, and, consequently, none can go on, and tissue metamorphosis, which is life itself, must cease.

Before concluding, allow us a word or two upon ozone, its physiological and therapeutical value, which are not under discussion, and are hardly properly to be considered in the limits of this paper. We have dealt with ozone generated from the oxygen within the body, and it is in this form that it plays its so important role in the oxidation of the tissues. There seems to be some doubt as to possibility of introducing ozone in its pristine integrity into the system. It may be a feat within the range of possibility, judging from the voluminous literature upon the subject that has been published only within the past year or more, yet from our experience in handling it, we prefer to regard it as an agent that performs its most useful work upon the field where it is ushered into existence, where nature calls it into life because it is needed to perform important duties.

Smelled Gas on a Trolley Car.

An elderly lady got on board an electric car recently and seemed to enjoy the ride immensely until they reached the power house, where the car was stopped for a few minutes to make a slight repair to the trolley truck. One of the workmen climbed to the roof of the car and began making the slight but necessary repairs. The lady caught hold of the conductor's sleeve and asked what the trouble was. He told her that there was a little trouble with the trolley and that the man had pulled it down to fix it. This seemed to satisfy her and she sank back into her seat sniffing the air and remarked "Oh! that's it, I thought I smelled gas somewhere."

ELECTRIC RAILWAY AND POWER NOTES.

The Woonsocket, R. I., Electric Machine and Power Company is to soon extend its incandescent service to Blackstone.

The Quincy and Boston Street Railway Company will soon offer for sale $50,000 of its capital stock at par, preference to be given to subscribers from Quincy and Weymouth.

The Waterbury, Conn., Traction Company has absorbed the Connecticut Electric Company, the terms being the purchase of the capital stock, $200,000, at par value, the same to be payable in bonds bearing five per cent.

The Belknap Motor Company receives the contract for the Vermont State Insane Asylum, at Waterbury, Me. This is another big card for the Belknap. It will require a 500 light machine and a complete installation for the new addition now nearly completed.

The work on the extension of the electric road, at Abington, is about completed on the South Weymouth side, but the company will not undertake to operate it this Winter. The road will be in readiness for the Spring travel, and the further extension of this enterprise will soon be determined.

The electric street car and power house, at Mansfield, O., was partially destroyed by fire on November 9. Two new boilers had been placed in the engine room and they were ruined by having water thrown on them while hot. The loss will not exceed $7,000; partially covered by insuranee. The fire started from a pile of shingles above the engine.

It is reported that the Thomson-Houston Electric Company is negotiating with the People's and the Electric Traction Companies, of Philadelphia, for contracts to furnish all their motors and car equipments. The General Electric Company has already secured the contract from the People's Traction Company to supply generators, and will probably secure the other contracts, involving about $2,000,000.

Electrical mechanics from all over the country were in Cleveland, O., the forepart of last week, to attend the National Convention of the National Brotherhood of Electrical Workers. Matters of considerable importance to electrical men were considered. The most important was the establishment of an apprenticeship system. It is proposed to have young men work four years as an apprentice before they can become known as competent workmen.

C. S. Merrick, of New Haven, Conn., was, on November 10, appointed receiver of the Ansonia Electric Company on a bond of $40,000, vice Wallace, resigned. The liabilities of the concern are about $100,000, with nominal assets of $277,000. With regard to a compromise offered, Mr. J. B. Wallace, the retiring receiver, said that the only creditor who stood in the way of this move was the Ansonia National Bank. The compromise was on a basis of 10 per cent. in cash and 50 per cent. in notes.

Supreme Court Justice Lippincott, of Jersey City, has granted a writ of *certiorari*, by which the ordinance giving to the New Jersey Consolidated Traction Company a practical monopoly of the street railway traffic in Jersey City will be taken to the Supreme Court for review. The Central Elevated Transit Company applied for the writ. It claims that the powers granted to the traction people are unusual. The writ will not prevent the traction company from operating its present lines pending decision.

Electricity will be substituted for steam power on the Brooklyn, Bath and West End Railroad, which runs from Thirty-sixth street, in Brooklyn, to Coney Island. This is a notable event, for it is the first time in New York State that electricity will take the place of steam locomotives. In consequence of the change the station agents will be dismissed. The prospective passengers will be delighted to hear that the Genett air brake will be used, and that the illumination, as well as heating, will be done by electricity.

ADVANCE INFORMATION.

New Electric Companies Formed and Important Constructions Projected.

VALUABLE INFORMATION FOR MANUFACTURERS AND DEALERS.

We publish below the earliest information obtainable relating to new electric railways, new electric light companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW from week to week.

CITY OF MEXICO, MEXICO.—Late advices from the City of Mexico state that the tram line from Guadalajara to San Pedro is reported to have been sold to an American company which expresses its intention of extending the road both north and west, and also of changing the motive power to electricity.

MARION, OHIO.—Prospects for a street railroad are brightening at Marion, Ohio. Geo. E. Turner, superintendent of the local lighting and power plant is pushing the matter to an early consummation. Plenty of local capital is proffered and the pleasure of the city council is awaited in the form of a general railroad ordinance which that body is preparing and will pass at once. Council, which is composed of the foremost and best business men of the town, are inclined to be very exacting in their requirements, owing to past experience with one or more loose franchises which have gone by default. Paving as well as some other features looking to the city's interest will be required. It is believed, however, that the ordinance will be mutually satisfactory and that everything will be ready for the quick construction on the arrival of suitable weather in the Spring. During the past Summer, Mr. Turner has designed and constructed a modern power house immediately adjoining the lighting plant, and placed therein a large water tube boiler and compound engine, all of which stands ready for the proposed railroad and such stationary motor work as has already been offered. The new company will do their own construction work and with only the track and line work to do, can put the line into operation in short order.

Electric Light and Power.

NEW YORK CITY.—The Conduit Construction Company, to construct electrical conduits in connection with electric railways, to introduce improved methods of propelling street and tram cars by underground trolleys, and to replace street railroad tracks and install thereon improved devices for propelling cars electrically. Capital, $25,000. Directors, Thomas C. Buck, Charles W. Keep, and Julian Meyers, of New York city; Robert L. Keen, of Montclair, N. J., and John J. Green, of Boonton, N. J.

TIFFIN, OHIO.—The Tiffin Street Railway company, Tiffin; increase of capital stock from $50,000 to $60,000.

BROOKLYN, N. Y.—The Riverhead Electric Light Company has been incorporated with a capital of $7,000. The directors are John R. Perkins, J. Henry Perkins, T. M. Griffing, John H. Perkins, William H. Sweezy, George H. Skidmore and William Litehard.

FREELAND, PA.—The Freeland Electric Light, Heat and Power Company has been incorporated with a capital of $15,000.

TRAVERSE CITY, MICH.—The Boardman River Electric Light and Power Company, with a capital stock of $100,000, has been incorporated.

LITERARY.

The Christmas number of *Scribner's* will contain a novelty in magazine illustration—a form of 16 pages of beautiful half-tone pictures printed with a tint, illustrating the delicate material of the sculptures of the Robbias.

"Principal Exports to the United States Declared at the Several Consulates," is an interesting pamphlet received from the Department of State. American manufacturers will doubtless be benefitted by a perusal of the tables it contains.

"The Incandescent Lamp and Its Manufacture," by Gilbert S. Ram, A. I. E. E. Published by the Electrician Printing and Publishing Company, London. 211 pages, 69 illustrations. Price, $3. Supplied on receipt of price by the Electrical Review Publishing Company, 13 Park Row.

The time is especially ripe for the production of this work on the incandescent lamp and its manufacture. The volume consists of some 200 pages, and is very concisely and clearly written. Now that every one interested is talking of the expiration of the Edison filament patent, and in consequence of other controversies and suits in connection with electric lighting by incandescent bulbs, this book will be especially appreciated by those who have not heretofore had the chance to study up the matter closely. Divided into 16 chapters, it presents in an admirable manner the history and processes of manufacture of the incandescent bulb. The illustrations are ample, and the book is not burdened with formula or other matter difficult of comprehension by the layman. But little mathematics enters into it, and that only in connection with the measurement of filaments. The preparation of the carbon filament is dwelt upon extensively, and another chapter contains an admirable series of lessons in glass blowing. Chapter XII gives a complete history of the process of exhausting, showing the different kinds of pumps, and describing pump rooms equipped with the different styles of evacuating apparatus. The mechanical portion of the manufacture is given the preference, and the book may be termed practical, scientific and complete for the great amount of valuable information therein contained. It is recommended to all who desire full particulars regarding incandescent lamps.

New York Electrical Society.

On Wednesday, November 29, the New York Electrical Society holds a symposium at Columbia College, Forty-ninth street and Madison avenue, at 8 P. M. The subject of the evening will be: "Electricity at the World's Fair and its Lessons."

Brief addresses will be given by J. J. Carty, on "Telephones;" Prof. F. B. Crocker, on "Electrical Congresses;" Charles Cuttriss, on "Cables;" Dr. C. E. Emery, on "Electric Light Engines;" James Hamblet, on "Electric Clocks;" C. O. Mailloux, on "Storage Batteries;" T. C. Martin, on "Electric Lighting;" Nikola Tesla, on his new "Electrical Oscillator;" Jos. Wetzler, on "Transportation;" and Schuyler S. Wheeler, on "Electric Motors." A large number of lantern views of the World's Fair will be thrown on the screen.

OUR CANADIAN LETTER.

Peterborough, Ont.—The light and power company have decided to purchase a steam plant. The engine will be 150 horse-power.

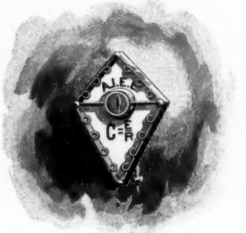
Niagara Falls, Ont.—Application will be made to Parliament by the Niagara Falls Electrical Railway Bridge Company to build a bridge across the Niagara river, between the falls and the whirlpool, and to operate thereon an electric railway.

Montreal, Que.—The St. Jean-Baptiste Electric Light Company will erect a new power station adjoining their present works at the corner of Rachel and Montana streets. The Bell Telephone Company contemplate the erection of an addition to their factory on Aqueduct street at an early date.

Montreal, November 24. J. A. C.

The closing of the books for the Erie telephone dividend shows 1,557 stockholders, a gain of 63 in three months. This makes $1,931,481 distributed by the company.

WATCH CHARM.



VEST PIN.

LAPEL BUTTON.

SINGLE LOCKET.

DOUBLE LOCKET.

SCARF PIN.

BADGES FOR THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.

American Institute of Electrical Engineers' Badges.

The committee upon badge and certificate of the American Institute of Electrical Engineers have completed its labors, which have resulted in the adoption by the Institute of a standard pin or badge, which has already been described in these columns, and to meet the demands of certain of the members the badge has been made up in a number of useful and artistic forms, illustrations of which we present herewith, which can be secured upon application to the secretary, Ralph W. Pope, 12 West Thirty-first street, New York.

The exposed portions of these articles are made of 18 karat gold with backing of 14 karat gold and are of the same general character as the badge, of which several hundred have already been issued to the members. The prices of the pin, lapel button, scarf pin and watch charm is the same, $8. That of the single locket $8 and of the double locket $10.

The certificates of the Institute, which were adopted at about the same time as the badge, are now being issued. They are handsome steel engravings and all active or full members are entitled to receive them upon application to the secretary and upon the payment of $2 to cover the cost of printing and engraving.

Lowering Electric Light Masts.

The steel electric light masts, in Cleveland, O., have been found unsatisfactory at their great height, and the only persons who want them continued are the vessel men, to whom they are a great convenience, being, because of their height of 275 to 300 feet above the lake and their great brilliancy, the best beacons on the whole line of the lakes. Notwithstanding this, the lowering of the great steel electric light masts in that city is now almost completed. It has been a slow and difficult task. The mast in the public square, which was 225 feet high, has had 75 feet taken off its lower end, and the one at the corner of Water and Superior streets is now undergoing similar treatment.

The manner in which a great mast, weighing many tons, is lowered is interesting Large derricks are placed in position beside the mast. Holes are drilled above the lower section and steel grippers inserted and the lines made taut. Then the rivets are cut away and the lower section, which looks like part of a thick boiler, is removed. The mast is let down, the guy ropes shortened, and the operation is repeated. This is simply a reversal of the manner in which the masts were built.

Electric Lighting in Austria and Hungary.

The central station which was established at Salzburg, in 1887, is now supplying current to over 6,000 incandescent lamps. The demand has increased so rapidly that it has been found necessary to increase the capacity of the plant by the addition of a battery of Tudor accumulators. The municipal authorities of Gratz have granted a concession to the Vienna Gas Industry Company for the establishment and operation of a central electric station for lighting and power purposes. The plant, which will be supplied by Messrs. Siemens & Halske, of Berlin, will comprise two Babcock & Wilcox water tube boilers, two compound steam engines, each of 150 horse-power, driving two 100 kilowatt dynamos and a battery of accumulators. The electric lighting question is being considered at Brünn, where it is proposed to establish a central station. The town of Tirnau, about 26 miles from Gressburg, is to be lighted by electricity, as also the towns of Nyiregyhaza and Szentes.

Hamilton, O., has its own gas plant, and it is now proposed to have an electric light plant to be operated by the city. The taxpayers will probably be given an opportunity to vote upon a proposition to spend $50,000 for an electric plant. Hamilton is on the right road.

KINDRED INTERESTS

The Metropolitan Electric Company, Chicago, are introducing the "Anti-Thunder Bolt" oil paper for armatures, etc.

Cumner, Craig & Company, Boston, Mass., electrical engineers and manufacturers' selling agents, will consolidate their office, stock rooms and workshop at 69 Broad street, on December 1.

The F. P. Little Electrical Construction and Supply Company, 135 Seneca street, Buffalo, N. Y., have sent out some serviceable blotter pads advertising the Kester arc lamp for all circuits.

The Lehigh Valley Creosoting Company has removed its Jersey City, N. J., office to rooms 136 and 137 Washington Building, 1 Broadway, New York city, where all communications should be addressed.

The H. W. Johns Manufacturing Company, 87 Maiden Lane, New York, are meeting with considerable success in the sales of their well-known strain insulators for overhead electric railway construction.

The Rhode Island Tool Company, Providence, R. I., manufacturers of bolts, nuts, etc., reports that business is improving. They look at matters in a cheerful light, and are hoping for much better times, beginning in the Spring.

Packard "Mogul" Lamps, manufactured by the New York and Ohio Company, Warren, O., in 200, 300 and 500 candle power sizes, and two and a half to three watts per candle-power efficiency, are rapidly gaining favor, owing to their many good points.

Henry R. Worthington, 86 Liberty street, New York, manufacturer of pumping engines and hydraulic machinery, besides receiving a general award for the exhibit made at the World's Fair, also received a special award for the Worthington condenser, which is described elsewhere in this issue.

The Buckeye Engine Company, Salem, Ohio, have received from the World's Fair officials one medal and diploma and two special diplomas for medium and high-speed simple engines, tandem compound and cross compound condensing engines and triple expansion four cylinder condensing engines.

Berlin Iron Bridge Company.—The State Street Horse Railway Company, of New Haven, Conn., have placed the contract for the roof on their new power house with the Berlin Iron Bridge Company, of East Berlin, Conn. The building will be 84 feet wide and 250 feet long, the roof trusses being of iron, covered with slate.

Frederick A. Scheffler, 74 Cortlandt street, New York, general sales agent for the Stirling Company, has received a telegram to this effect: "Withdraw all tenders World's Fair boilers. Have disposed of entire lot. Stirling Company." This means that the Stirling Company has sold the entire 2,800 horse-power of boilers which they had on exhibition at the World's Fair.

"A useful check upon the boiler-house employees," so writes the superintendent of a large gas light plant located in Westchester County, N. Y., in speaking of the merits of the Edson time and pressure-recording gauge, which he regards as of paramount importance in a steam plant "especially at night." Another testimonial, just received from the chief engineer of a large building, reads: "When we introduced the Edson pressure-recording and alarm gauge into this building, we had it working in secret for several weeks, and then brought it out where the firemen could see it. Our object was to see how things were going in the night. After they found what we were doing, the change in the record was so great, I doubt if there is anything to compare with it." As has been so often demonstrated, the Edson recorder will soon pay for itself in fuel saved, owing to the more steady and attentive firing, occasioned by its presence, and secure greater immunity from the results of carelessness, etc., particularly in plants where they want to economize in the operation of their boiler-house. The maker, Mr. Jarvis B. Edson, of 87 Liberty street, New York, reports the usual amount of business, notwithstanding the alleged "hard times," and is kept very busy filling his regular orders.

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No Plumbing Required.
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